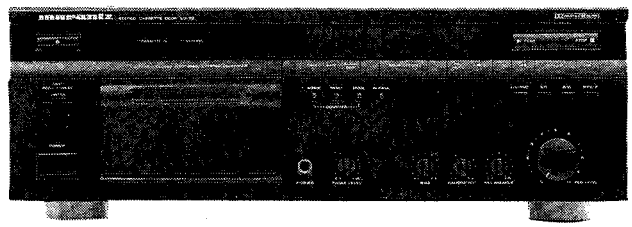
Service Manual

74 SD72/01B/02B/05B/07B /01G/02G

Stereo cassette deck

For repair information of the cassette mechanism see Service Manual of "Recorders tape deck CMAY5Z039A



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marantz®

model SD-72

4822 725 50947

MZ 2981

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ company has created the ultimate in stereo sound.
Only **original MARANTZ parts** can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

Parts for your MARANTZ equipment are generally available to our National Marantz Subsidiary or Agent.

MARANTZ INTERNATIONAL
Vestdijk 9
5600 MD Eindhoven
The Netherlands
Phone: +31/40.758290
Telefax: +31/40.75.82.99
Telex: 35000 PHTC NL routing IND NLMTFAT

ORDERING PARTS:

Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified.
The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

PARTS ORDERING

Parts may be ordered at the following addresses:

AUSTRIA
HORNYPHON
Vertriebsgesellschaft GmbH
Wienerbergstrasse 1
A 1101 Wien
Austria
Telex: 132.332

BELGIUM
SVD DIVISION MARANTZ
Industrialaan 1
1720 Groot-Bijgaarden
Belgium
Telex: 24466

CHILE
MARANTZ
DIVISION OF PHILIPS S.A.
AV. Santa Maria, 0760
Casilla 2687
Santiago
Telex: 240.239

DENMARK
MARANTZ
DIVISION OF PHILIPS
SERVICE A/S
Prags Boulevard 80
Postbox 1919
DK-2300 København S
Denmark
Telex: 31201

FINLAND
MARANTZ
DIVISION OF OY PHILIPS Ab
Kaivokatu 8
00100 Helsinki
Finland
Telex: 124811

FRANCE
MARANTZ FRANCE
4 Rue Bernard Palissy
92600 Asnières
France
Telex: 611651

GERMANY
MARANTZ GERMANY GmbH
Alexanderstrasse 1
2000 Hamburg
Germany

THE NETHERLANDS
Elpro Marantz
Wint Hontlaan 28
3526 KV Utrecht
The Netherlands
Telex: 4748

NORWAY
MARANTZ
DIVISION OF PHILIPS A/S
Sandstuveien 40
0680 Oslo 6
Norway
Telex: 72640

GREAT BRITAIN
MARANTZ AUDIO U.K. Ltd
Unit 15/16
Saxon Way Industrial Estate
Moor Lane
Harmondsworth UB7 OLW
Great Britain
Telex: 935196

GREECE
SHERTON ELECTRONICS S.A.
P.O.Box 21025
Hippocratus Street 188
Athens 11471
Greece
Telex: 216.795

JAPAN
MARANTZ JAPAN, Inc.
35-1, 7-chome, Sagamiono
Sagamihara-shi, Kanagawa
Japan

KUWAIT
AL ALAMIAH ELECTRONICS
Ussama Building
Fahd al Saleem Street
P.O.Box 23781
Safat-Kuwait
Telex: 22694

ITALY
MARANTZ ITALIANA S.P.A.
Via Chiese, 74
20126 Milano
Italy

SAUDI ARABIA
AL ALAMIAH ELECTRONICS
P.O.Box 5954
University Street
Riyadh 11432
Saudi Arabia
Telex: 401530

SOUTH AFRICA
MARANTZ
DIVISION OF PHILIPS S.A.
Main Road Martindale
P.O. Box. 58088
Newville 21114
South Africa

SPAIN
PHONO S.A.
Ignacio Iglesias 10
Badalona (Barcelona)
Spain
Telex: 59355

SWEDEN
MARANTZ
DIVISION OF PHILIPS
Försäljning AB
Tegeluddsvägen 1
S-115 84 Stockholm
Sweden
Telex: 14060

SWITZERLAND
MARANTZ
Technischer Service
Duenstrasse 3
3186 Düdingen
Switzerland

TURKEY
DOGRUOL Ltd.
I.M.C.
6 Blok N°6310
Unkapani
Istanbul
Turkey
Telex: 22085

MALTA
CACHIA & GALEA
Republic Street, 68D
Valetta
Telex: 1682

PORTUGAL
MARANTZ
Divisao philips S.A. service
Outurela-carnaxide
2795 LinDA-A-VELHA
Telex: 43906

All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please, contact the nearest facility for the necessary assistance.

In case of difficulties, do not hesitate to contact the Technical Department at abovementioned address.

TECHNICAL SPECIFICATIONS (DIN)

Motor(s) and type . . . . . Two DC
Number of heads . . . . . Three

Frequency range (3 dB limits – no Dolby)
- Type IV (metal) tape . . . . . 20 Hz–21 kHz
- Type II (CrO_2) tape . . . . . 20 Hz–20 kHz
- Type I (Fe/Normal) tape . . . . . 20 Hz–19 kHz

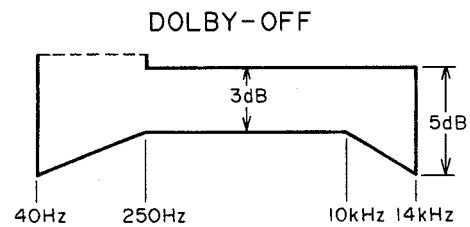
Signal to noise ratio (CrO_2 tape at 1 kHz) (no Dolby/Dolby B/C) . . . . . 65/70/78 dB
Wow and flutter (RMS weighted) 0.03%
Output level/impedance . . . . . 500 mV/2 kOhm
Headphone output . . . . . Yes variable

Dimensions
- Width . . . . . 420 mm
- Height . . . . . 132 mm
- Depth . . . . . 334 mm

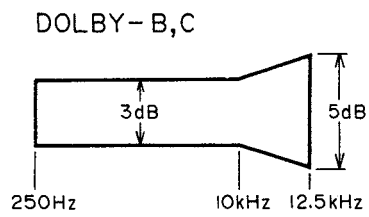
Net weight . . . . . 6.5 kg

Power supply
- /02B/02G version . . . . . 230 V AC 50/60 Hz
- /05B/07B version . . . . . 240 V AC 50/60 Hz
- /01B/01G version (4 voltages) . . . . . 110–240 V AC 50/60 Hz
- U version . . . . . 120 V AC 60 Hz
- F version . . . . . 100 V AC 50/60 Hz

Specifications subject to change without prior notice.

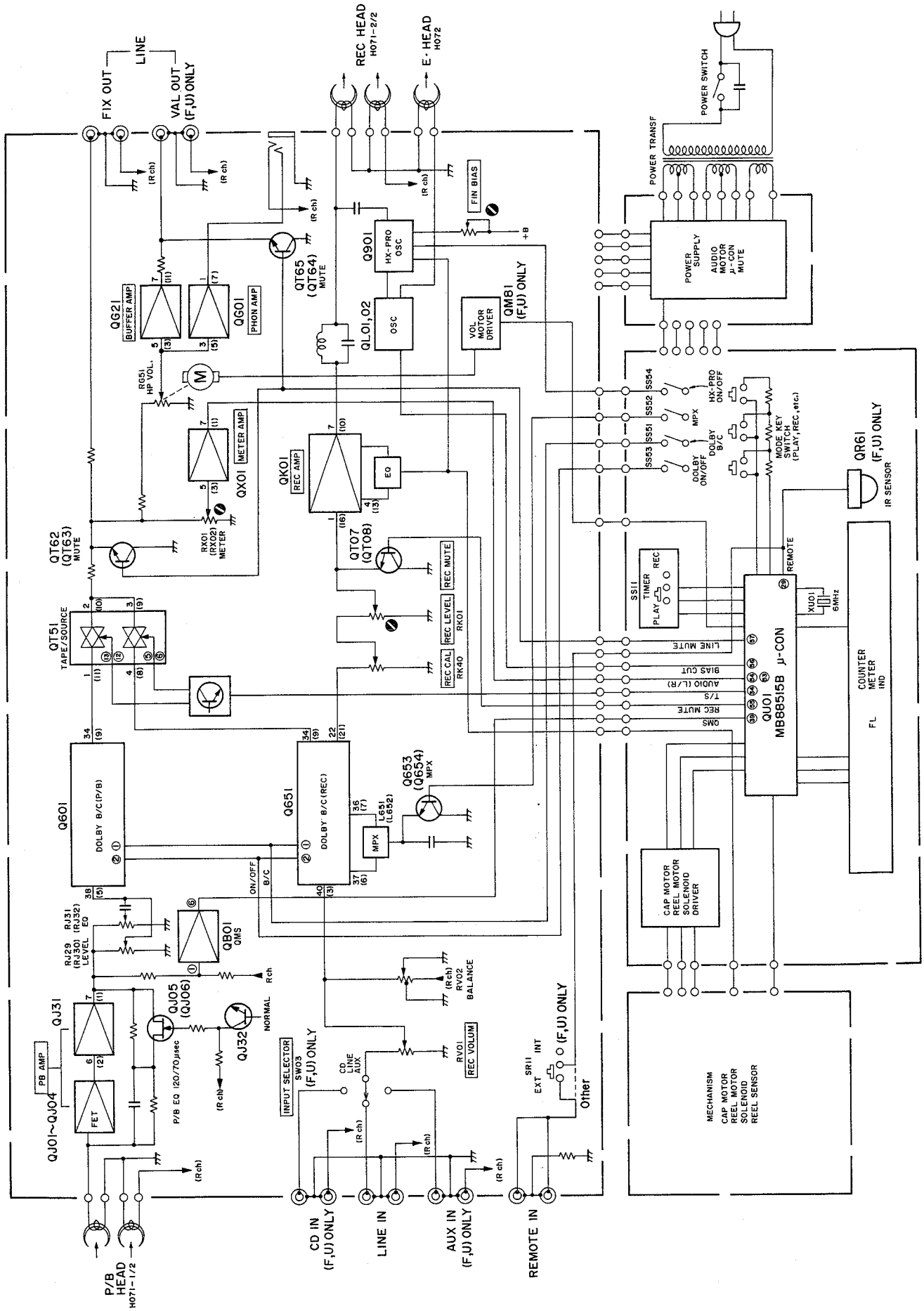


Overall frequency response

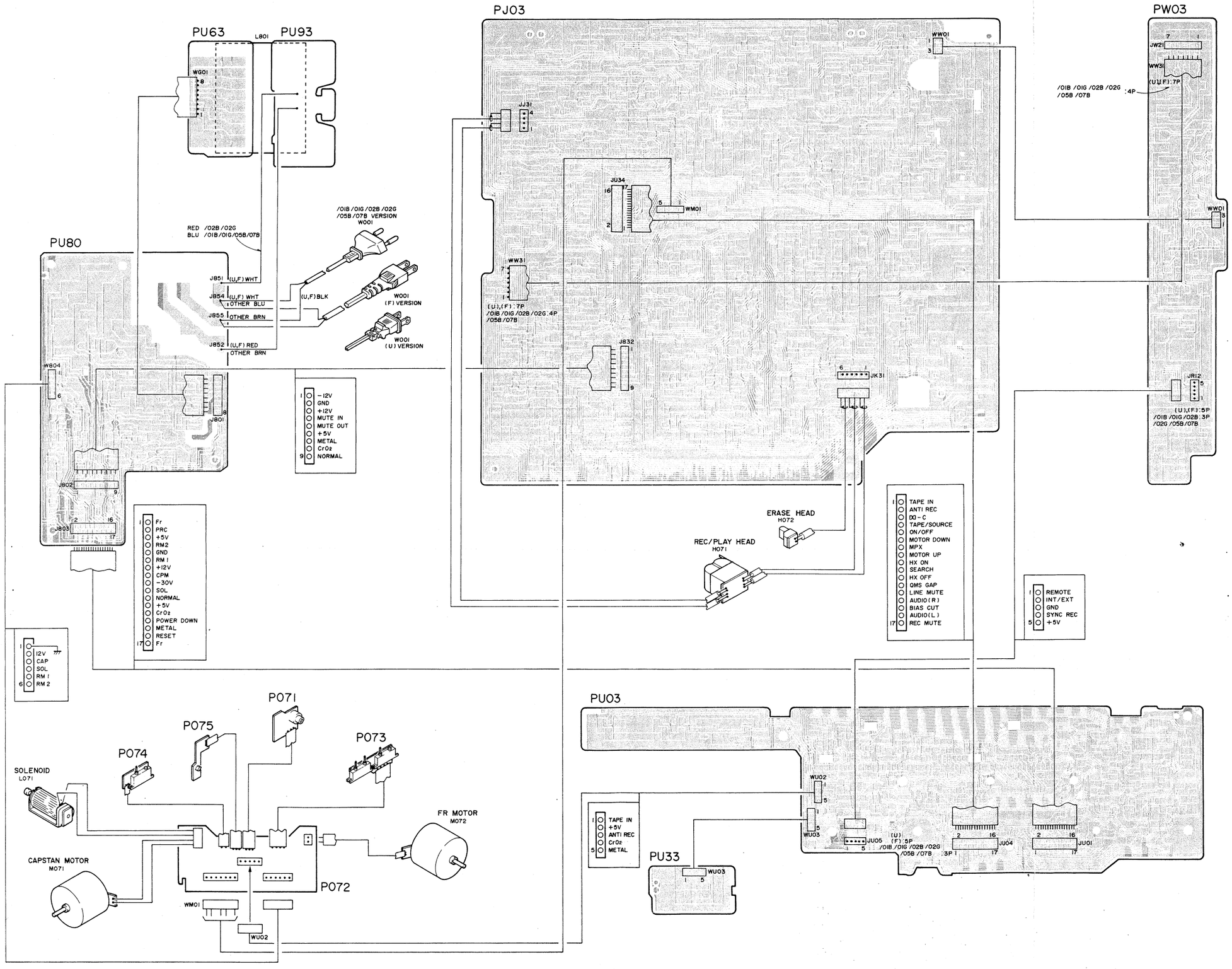


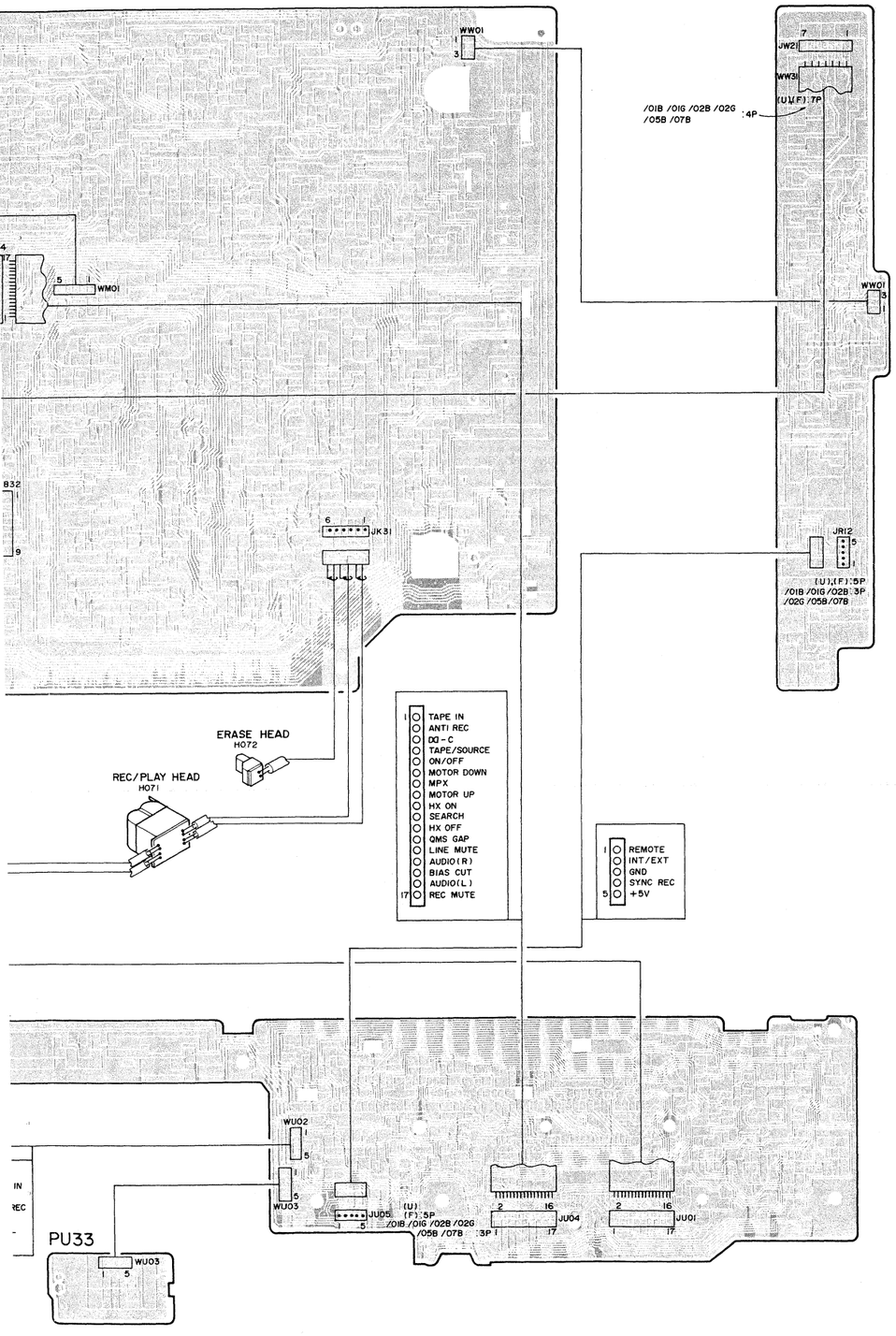
Tape: AC-224 (Normal)
Tape: AC-513 (CrO_2)
Tape: AC-712 (Metal)

1. BLOCK DIAGRAM

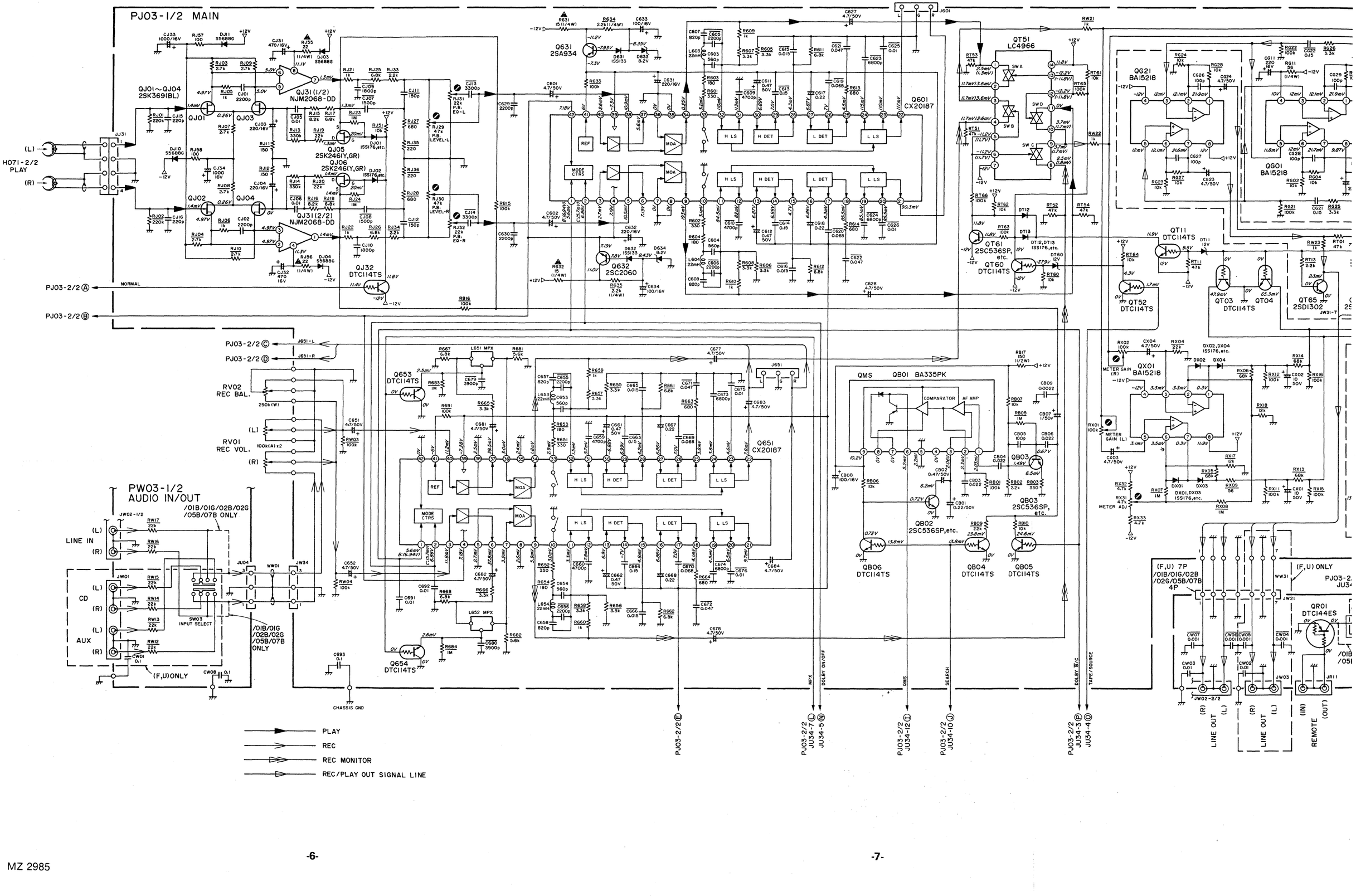


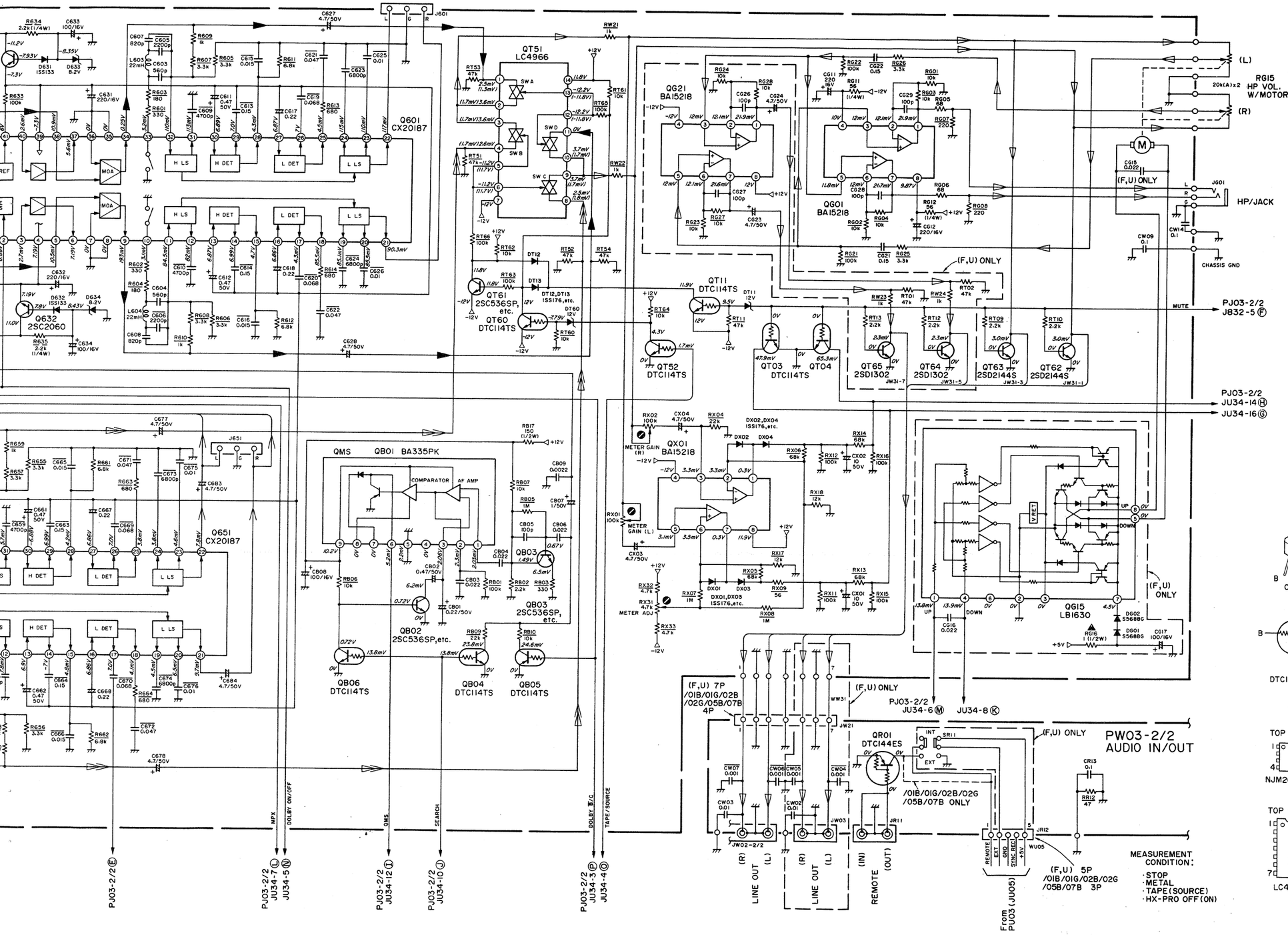
2. CONNECTION DIAGRAM (component side)

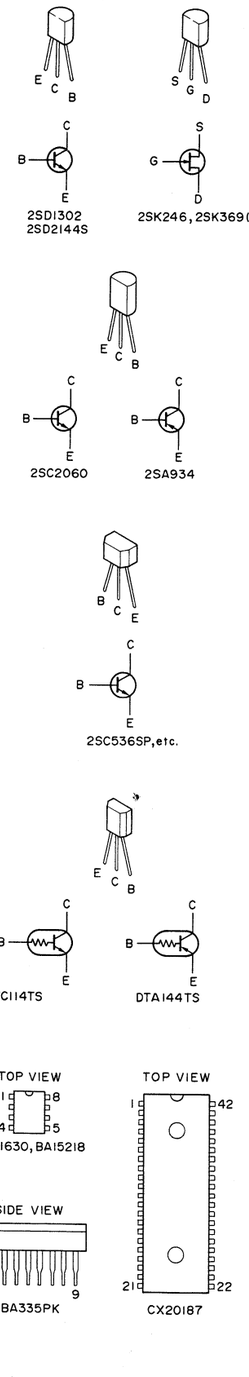


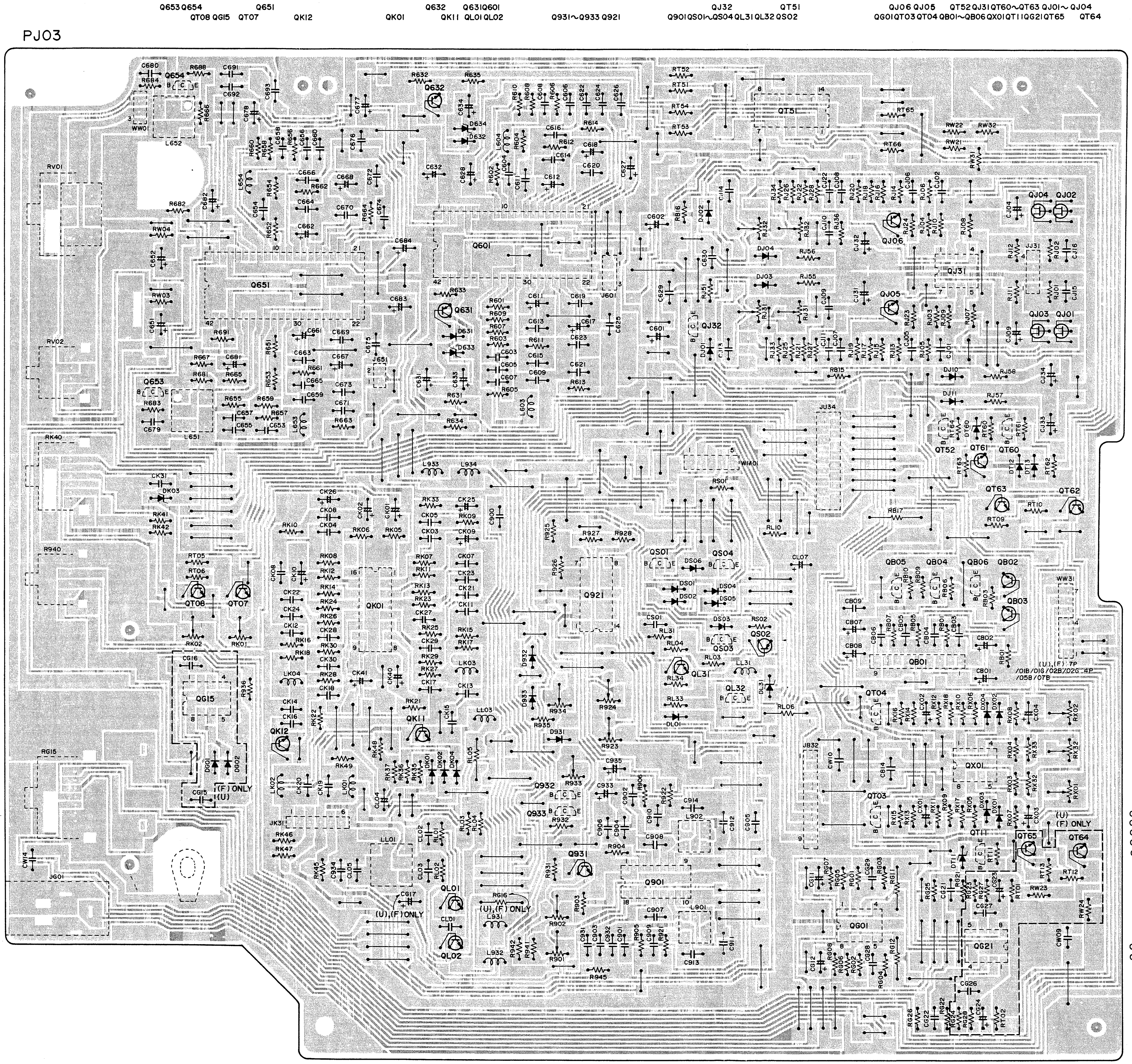

PW03
WW01
JW21
WW31
(U),(F):7P
/01B /01G /02B /02G /05B /07B :4P
WW01
WM01
JK31
JR12
(U),(F):5P
/01B /01G /02B :3P
/02G /05B /07B
ERASE HEAD
H072
REC/PLAY HEAD
H071
TAPE IN
ANTI REC
DD-C
TAPE/SOURCE
ON/OFF
MOTOR DOWN
MPX
MOTOR UP
HX ON
SEARCH
HX OFF
QMS GAP
LINE MUTE
AUDIO(R)
BIAS CUT
AUDIO(L)
REC MUTE
REMOTE
INT/EXT
GND
SYNC REC
+5V
WU02
WU03
JU05
(U)
(F):5P
/01B /01G /02B /02G
/05B /07B :3P
JU04
JU01
PU33
WU03

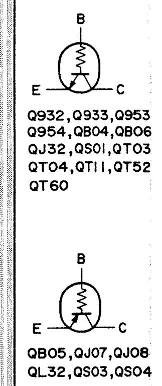
3. SCHEMATIC DIAGRAM AND PARTS LOCATION (pattern side)

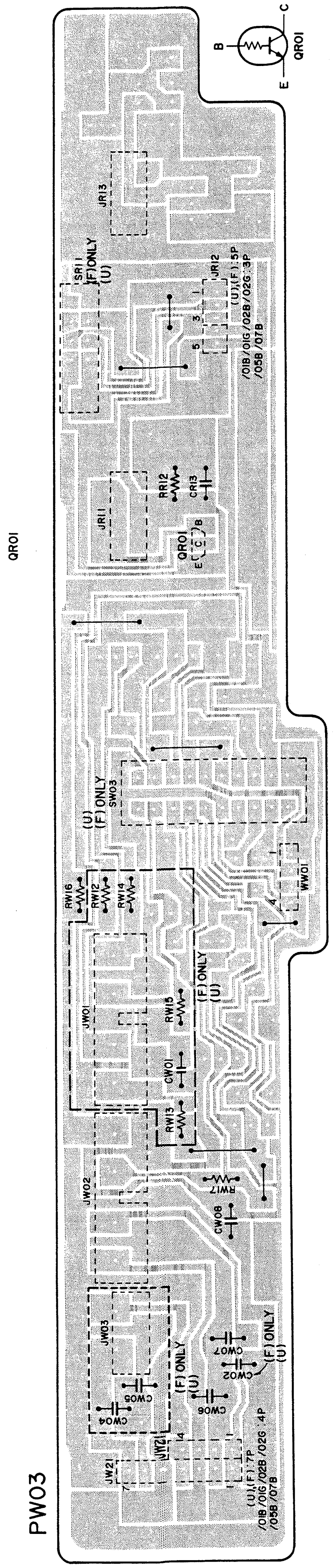



Q601 CX20187
H LS
H DET
L DET
L LS
MOA
QT51 LC4966
SW A
SW B
SW C
SW D
QT61 2SC536SP, etc.
QT60 DTC114TS
QT11 DTC114TS
QT52 DTC114TS
QT03 DTC114TS
QT04
QT65 2SD1302
QT64 2SD1302
QT63 2SD2144S
QT62 2SD2144S
Q632 2SC2060
Q633 8.2V
Q634 8.2V
Q631 8.2V
D631 1SS133
D632 1SS133
D633 8.2V
Q651 CX20187
QMS QB01 BA335PK
COMPARATOR
AF AMP
QB02 2SC536SP, etc.
QB03 2SC536SP, etc.
QB04 DTC114TS
QB05 DTC114TS
QB06 DTC114TS
QG21 BA15218
Q601 BA15218
QX01 BA15218
QG15 LB1630
QR01 DTC144ES
METER GAIN (R)
METER GAIN (L)
METER ADJ
RG15 HP VOL. W/MOTOR
20k(A)x2
(L)
(R)
(F,U) ONLY
HP/JACK
CHASSIS GND
MUTE
PJ03-2/2 J832-5 (F)
PJ03-2/2 JU34-14 (H)
PJ03-2/2 JU34-16 (G)
PJ03-2/2 JU34-6 (M)
PJ03-2/2 JU34-8 (K)
PJ03-2/2 (E)
PJ03-2/2 JU34-7 (L)
JU34-5 (N)
PJ03-2/2 JU34-12 (I)
PJ03-2/2 JU34-10 (J)
PJ03-2/2 JU34-3 (P)
JU34-4 (O)
MPX
DOLBY ON/OFF
QMS
SEARCH
DOLBY B/C
TAPE/SOURCE
(F,U) 7P /01B/01G/02B /02G/05B/07B 4P
(F,U) ONLY
/01B/01G/02B/02G /05B/07B ONLY
(F,U) 5P /01B/01G/02B/02G /05B/07B 3P
From PU03 (JU05)
PW03-2/2 AUDIO IN/OUT
(R) LINE OUT (L)
(R) LINE OUT (L)
(IN) REMOTE (OUT)
MEASUREMENT CONDITION:
·STOP
·METAL
·TAPE(SOURCE)
·HX-PRO OFF(ON)

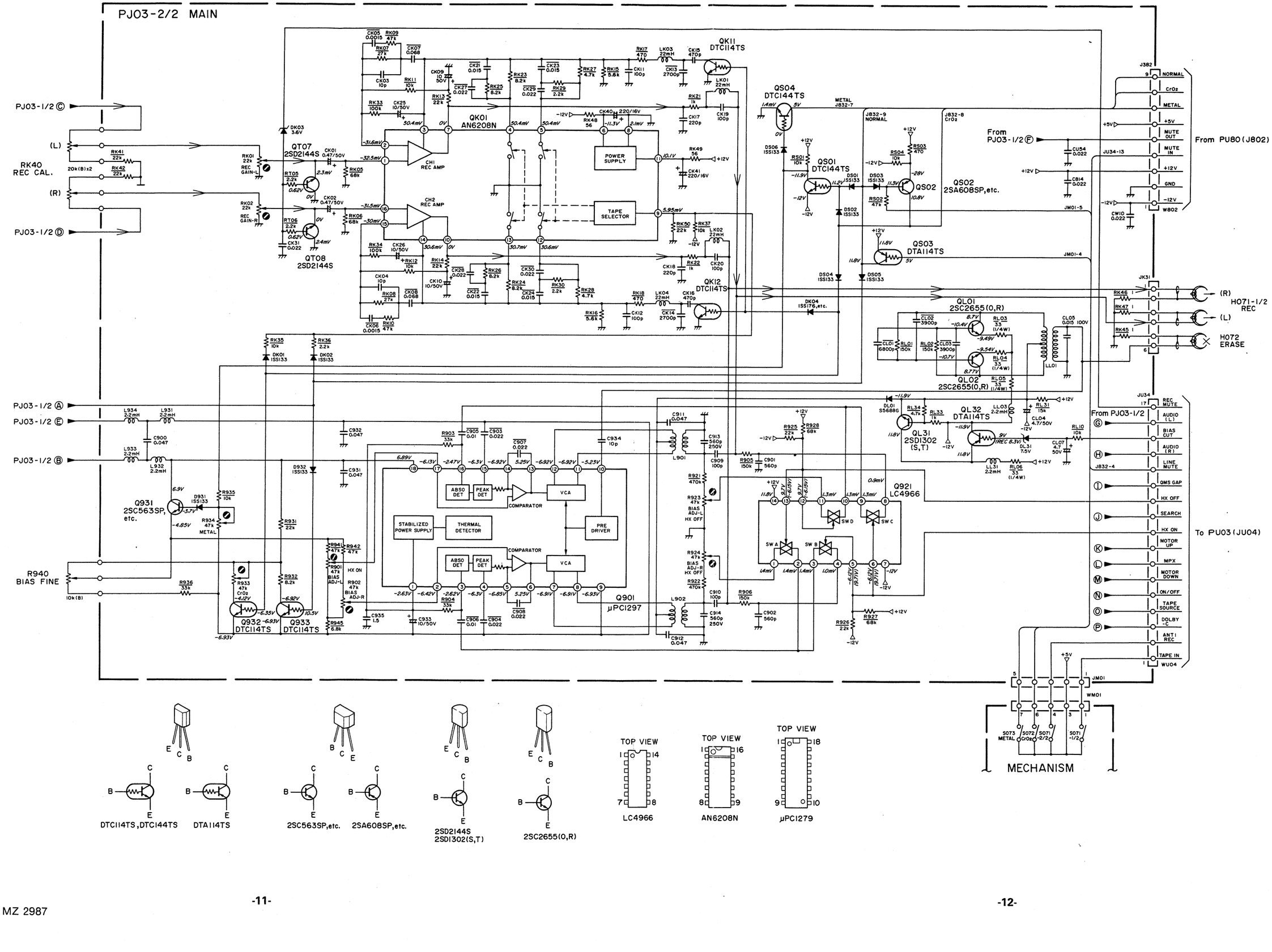

2SD1302
2SD2144S
2SK246, 2SK369(BL)
2SC2060
2SA934
2SC536SP, etc.
DTC144ES
DTC114TS
DTA144TS
TOP VIEW
NJM2068-DD
LBI630, BA15218
LC4966
SIDE VIEW
BA335PK
CX20187


Q653 Q654 QT08 QG15 QT07 Q651 QK12 QK01 Q632 QK11 Q631 Q601 QL01 QL02 Q931~Q933 Q921
QJ32 QT51 Q901 QS01~QS04 QL31 QL32 QS02
QJ06 QJ05 QT52 QJ31 QT60~QT63 QJ01~QJ04 QG01 QT03 QT04 QB01~QB06 QX01 QT11 QG21 QT65 QT64
PJ03


B
E
C
Q932,Q933,Q953
Q954,QB04,QB06
QJ32,QS01,QT03
QT04,QT11,QT52
QT60
B
E
C
QB05,QJ07,QJ08
QL32,QS03,QS04


QR01
PW03

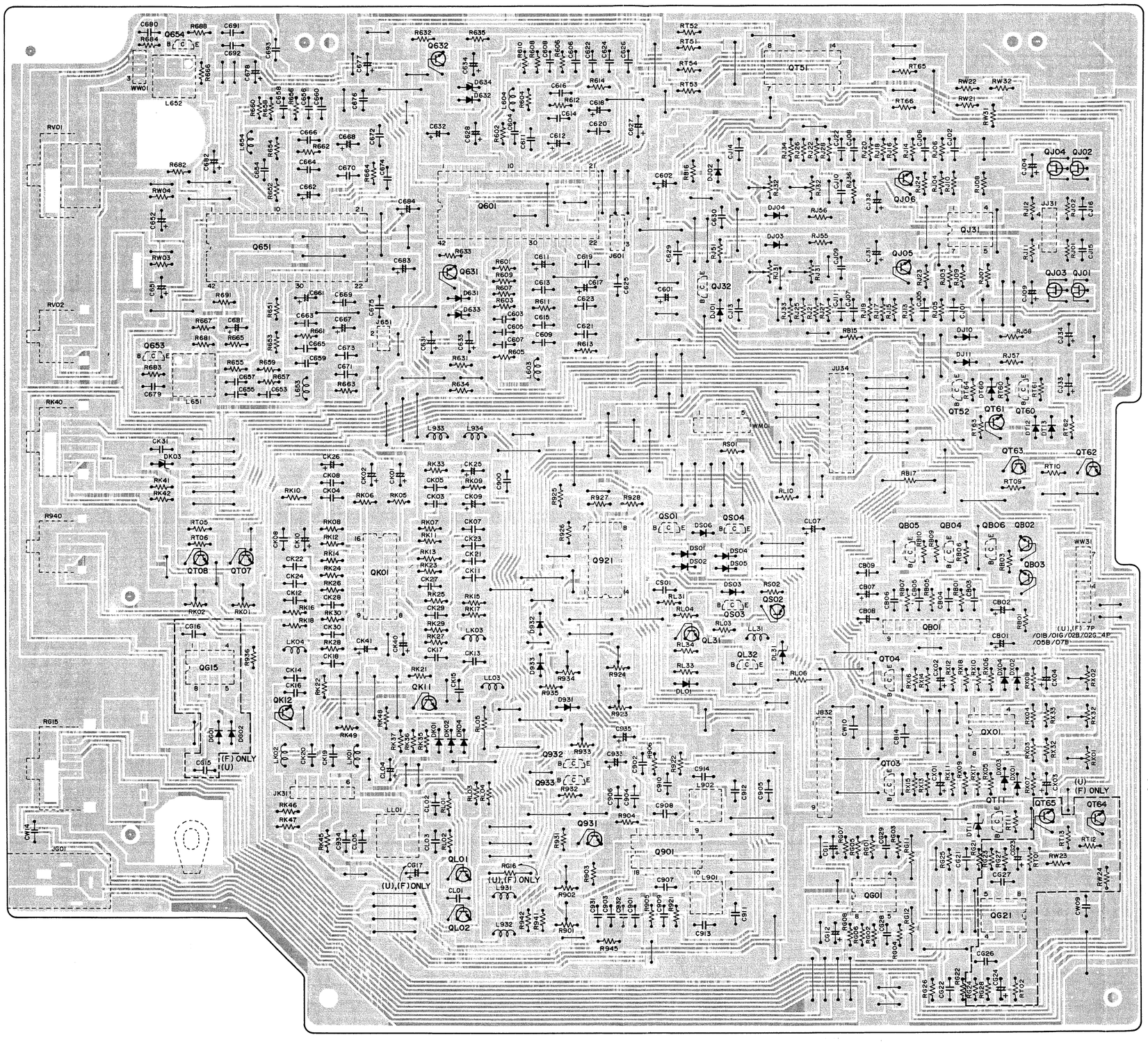
PJ03-2/2 MAIN

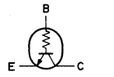

PJ03-1/2 Ⓒ
PJ03-1/2 Ⓓ
PJ03-1/2 Ⓐ
PJ03-1/2 Ⓔ
PJ03-1/2 Ⓑ
RK40 REC CAL.
20k(B)x2
(L)
(R)
RK41 22k
RK42 22k
RK01 22k REC GAIN-L
RK02 22k REC GAIN-R
QT07 2SD2144S
QT08 2SD2144S
DK03 3.6V
CH1 REC AMP
CH2 REC AMP
QK01 AN6208N
QK11 DTC114TS
QK12 DTC114TS
POWER SUPPLY
TAPE SELECTOR
QS04 DTC144TS
QS01 DTC144TS
QS02 2SA608SP,etc.
QS03 DTA114TS
METAL J832-7
J832-9 NORMAL
J832-8 CrO2
From PJ03-1/2 Ⓕ
From PU80(J802)
To PU03(JU04)
QL01 2SC2655(O,R)
QL02 2SC2655(O,R)
QL32 DTA114TS
QL31 2SD1302 (S,T)
DK01 1SS133
DK02 1SS133
DK04 1SS176,etc.
DL01 S5688G
Q931 2SC563SP, etc.
D931 1SS133
D932 1SS133
Q932 DTC114TS
Q933 DTC114TS
R940 BIAS FINE
10k(B)
HX ON
BIAS ADJ-L
BIAS ADJ-R
ABSO DET
PEAK DET
COMPARATOR
VCA
PRE DRIVER
STABILIZED POWER SUPPLY
THERMAL DETECTOR
Q901 µPC1297
L901
L902
Q921 LC4966
SW A
SW B
SW C
SW D
HX OFF
BIAS ADJ-L HX OFF
BIAS ADJ-R HX OFF
JK31
JU34
JU32
JM01-5
JM01-4
JM01
WM01
(R) H071-1/2 REC
(L) H072 ERASE
NORMAL
CrO2
METAL
+5V
MUTE OUT
MUTE IN
+12V
GND
-12V
REC MUTE
AUDIO (L)
BIAS CUT
AUDIO (R)
LINE MUTE
DMS GAP
HX OFF
SEARCH
HX ON
MOTOR UP
MPX
MOTOR DOWN
ON/OFF
TAPE SOURCE
DOLBY -C
ANTI REC
TAPE IN
S073 METAL
S072 CrO2
S071 -2/2
S071 -1/2
MECHANISM

DTC114TS, DTC144TS
DTA114TS
2SC563SP, etc.
2SA608SP, etc.
2SD2144S
2SD1302(S,T)
2SC2655(O,R)
TOP VIEW
LC4966
AN6208N
µPC1279

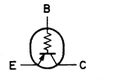
Q653 Q654 Q651 Q632 Q631 Q601 QJ32 QT51 QJ06 QJ05 QT52 QJ31 QT60~QT63 QJ01~QJ04
QT08 QG15 QT07 QK12 QK01 QK11 QL01 QL02 Q931~Q933 Q921 Q901 QS01~QS04 QL31 QL32 QS02 QG01 QT03 QT04 QB01~QB06 QX01 QT11 QG21 QT65 QT64

PJ03





Q932,Q933,Q953
Q954,QB04,QB06
QJ32,QS01,QT03
QT04,QT11,QT52
QT60



QB05,QJ07,QJ08
QL32,QS03,QS04

PU03 LOGIC/KEY SWITCH

PU33 TIMER SWITCH

To PJ03 (JU34)

To PW03 (JR12)

FROM PJ03(J803)

QU01 MB88515B

(F,U) ONLY

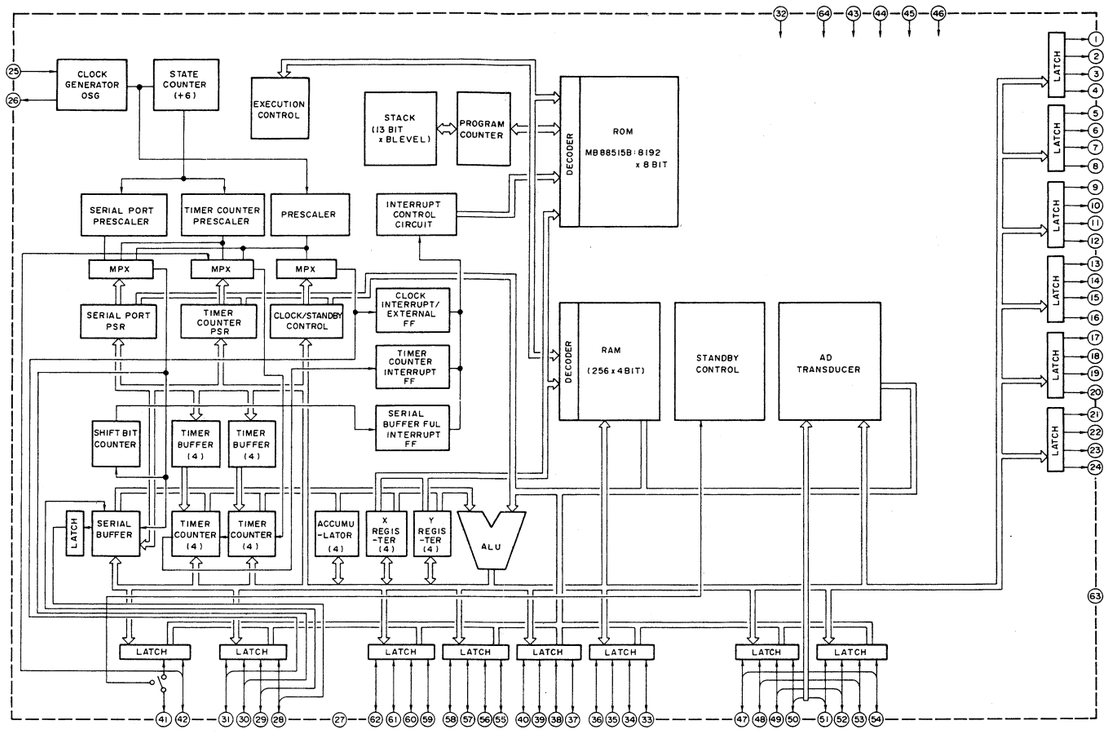
MB88515B

DTC114TS

DTA114ES

2SC536SP, etc.

BLOCK DIAGRAM



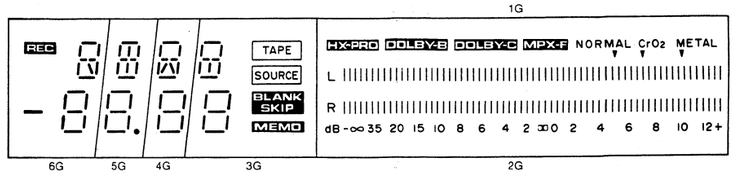
* PSR: Prescaler Select Register

Note:
The E37/Start pin (pin 41) becomes the start pin when "with standby function" is selected as a mask option, while when "without standby function" is selected, it becomes the E37 pin.

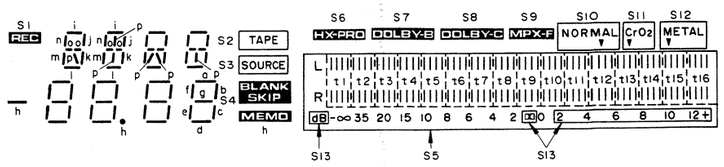
TERMINAL CONNECTION

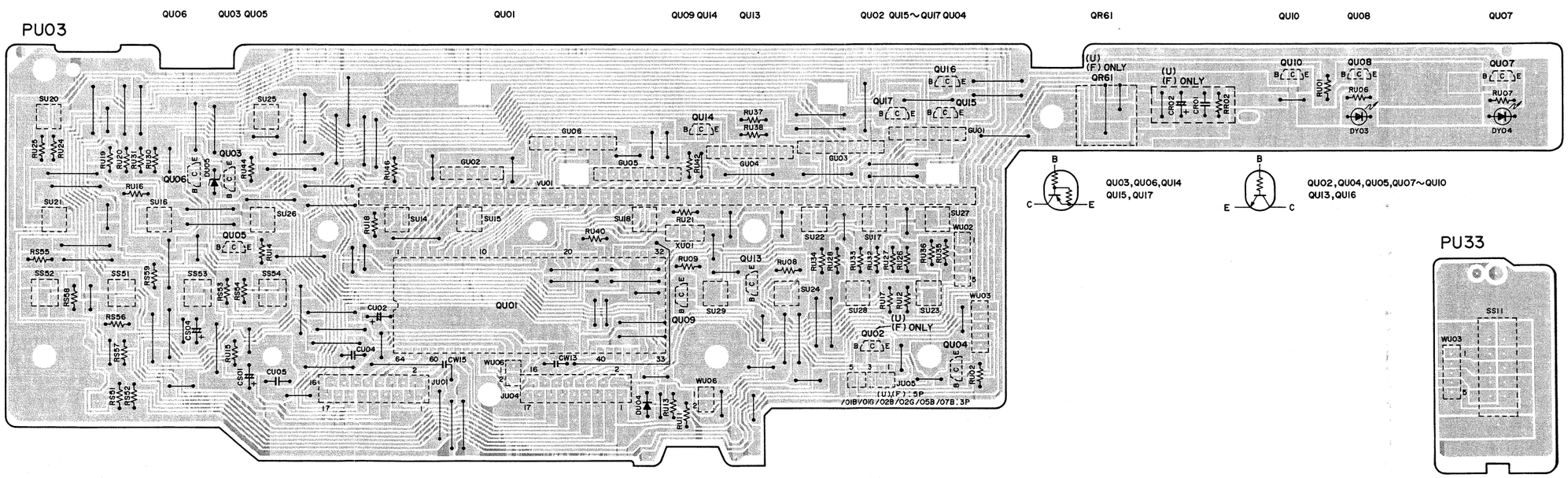
TERMINAL NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
ELECTRODE	F	F	6G	(S1)	(S2)	(S3)	6G	(S4)	NP	5G	(S6)	(S7)	4G	(S8)	3G	(S9)				
TERMINAL NO.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
ELECTRODE	(S10)	(S11)	(S12)	NP	3G	IC	IC	2G	NP	(S5)	(a)	(l)	(m)	2G	(p)	(k)	(o)	(n)	(j)	NP
TERMINAL NO.						37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
ELECTRODE						(l)	(h)	(d)	(e)	(c)	2G	(g)	(f)	(b)	NP	(S13)	2G	IG	F	F

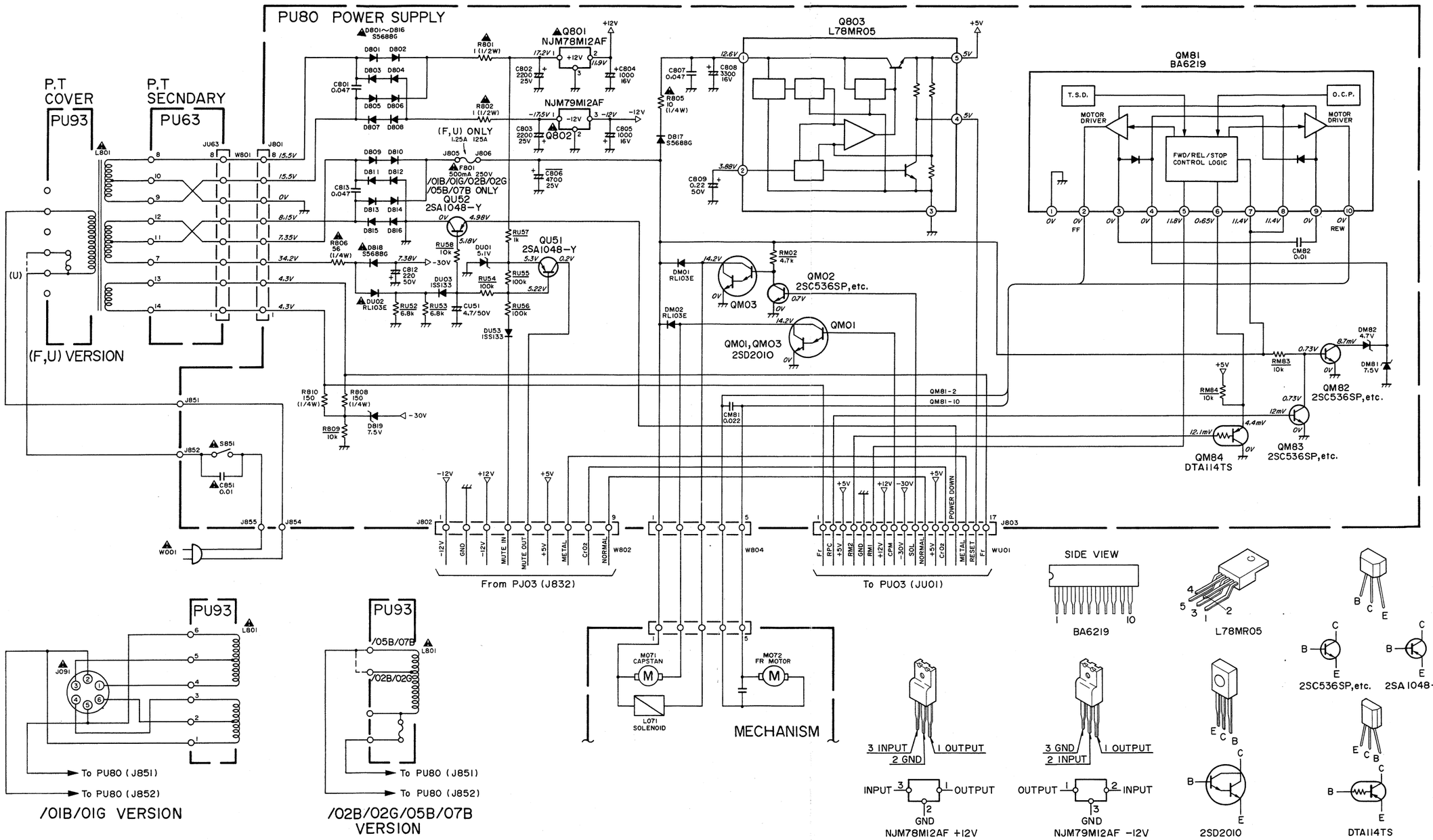
NOTES F: FILAMENT
G: GRID
NP: NO PIN
IC: INTERNALLY CONNECTET PIN



INTERNAL CONNECTION

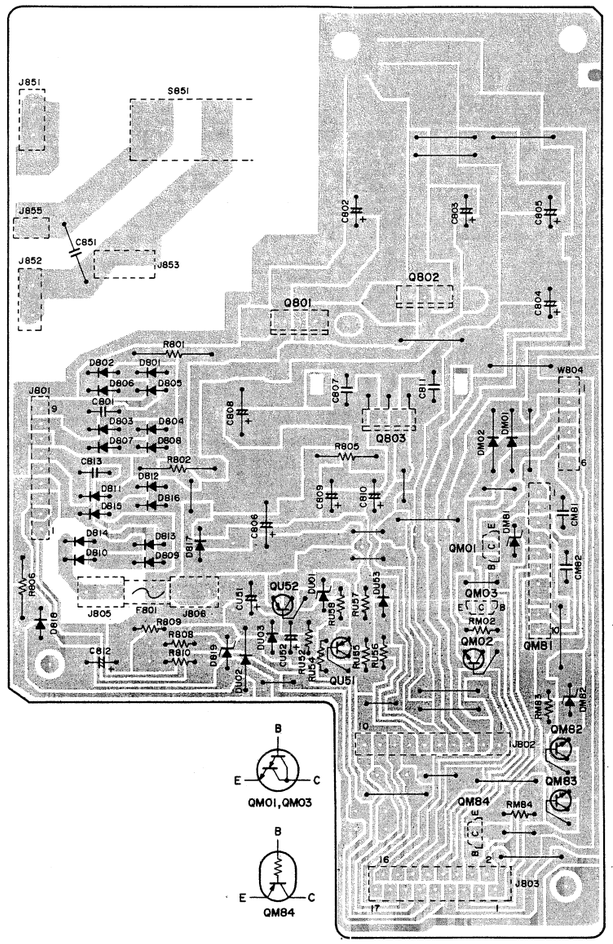




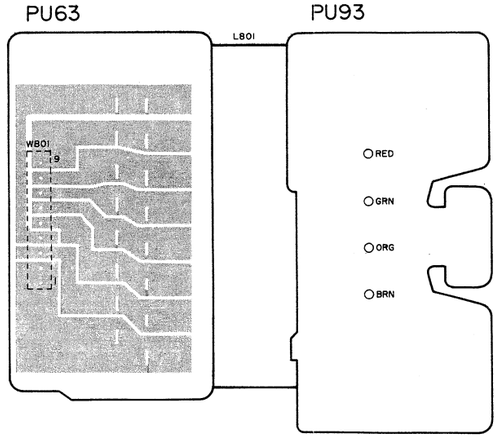

PU80 POWER SUPPLY
P.T COVER PU93
P.T SECNDARY PU63
(U)
(F,U) VERSION
(F,U) ONLY 1.25A 125A
/01B/01G/02B/02G /05B/07B ONLY
Q801 NJM78MI2AF
NJM79MI2AF
Q802
Q803 L78MR05
QU52 2SA1048-Y
QU51 2SA1048-Y
QM01 QM01, QM03 2SD2010
QM02 2SC536SP,etc.
QM03
QM81 BA6219
T.S.D.
O.C.P.
MOTOR DRIVER
FWD/REL/STOP CONTROL LOGIC
QM82 2SC536SP,etc.
QM83 2SC536SP,etc.
QM84 DTA114TS
From PJ03 (J832)
To PU03 (JU01)
M071 CAPSTAN
M072 FR MOTOR
L071 SOLENOID
MECHANISM
To PU80 (J851)
To PU80 (J852)
/01B/01G VERSION
/02B/02G/05B/07B VERSION
SIDE VIEW
BA6219
L78MR05
2SC536SP,etc.
2SA1048-Y
3 INPUT
2 GND
1 OUTPUT
NJM78MI2AF +12V
3 GND
2 INPUT
1 OUTPUT
NJM79MI2AF -12V
2SD2010
DTA114TS

PU80

QU52 Q801 QU51 Q803 Q802 QM01~QM03 QM81~QM84



PU63 PU93

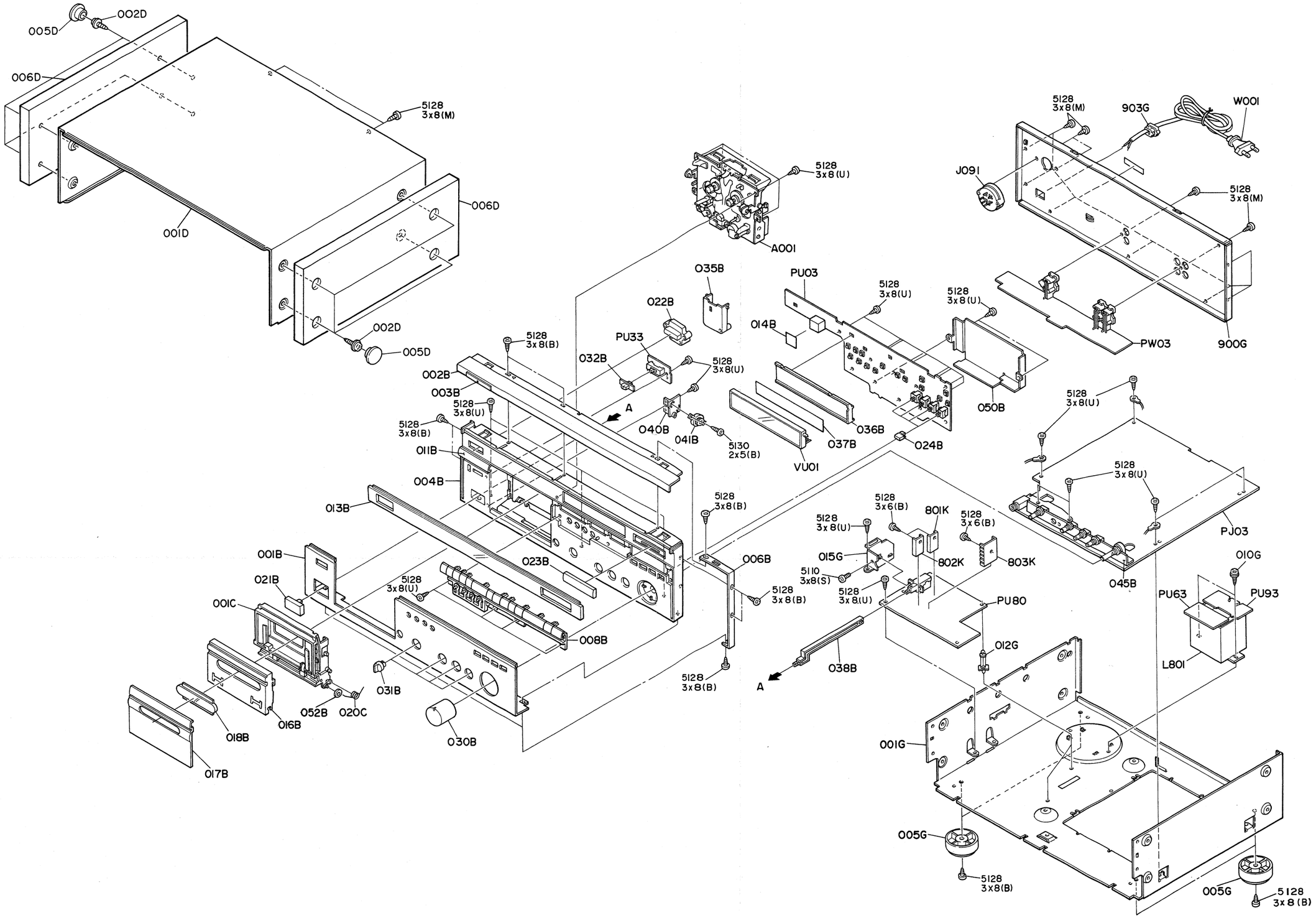


MICROPROCESSOR I/O PINS AND THEIR FUNCTIONS

SYM NO. QU01 TYPE NO. MB88515

Pin No.	Port Name		I/O	Act	Function
1	E0	E0	O	H	Segment Output
2	E1	E1	O	H	
3	E2	E2	O	H	
4	E3	E3	O	H	
5	E4	E4	O	H	
6	E5	E5	O	H	
7	E6	E6	O	H	
8	E7	E7	O	H	
9	E8	E8	O	H	
10	E9	E9	O	H	
11	E10	E10	O	H	
12	E11	E11	O	H	
13	E12	E12	O	H	
14	E13	E13	O	H	
15	E14	E14	O	H	
16	E15	E15	O	H	
17	E16	E16	O	H	Digit Output
18	E17	E17	O	H	
19	E18	E18	O	H	
20	E19	E19	O	H	
21	E20	E20	O	H	
22	E21	E21	O	H	
23	E22	E22	O	H	
24	E23	E23	O	H	
25	EX	MAIN CLK	I	–	Clock Input
26	X	MAIN CLK	O	–	Clock Output
27	RESET	RESET	I	H	Reset Input
28	S0	FWD/REV	O	L	FWD (H-REV) Indicate
29	S1	RC-5	I	L	Remote Control Input
30	SC	N·C	–	–	–
31	E27	P-Down	O	L	Power Off Mecha Reset
32	VSS	VSS	–	–	GND

Pin No.	Port Name		I/O	Act	Function
33	R0	REC/PLAY	O	H	REC/PLAY Mode
34	R1	Quick	I	L	Quick Reverse
35	R2	B-SKIP	O	L	Blank Skip Indicator
36	R3	–	–	–	–
37	R4	–	–	–	–
38	R5	SARCH	O	H	QMS Sense Control
39	R6	QMS	I	H	Music Gap
40	R7	QMS ON/OFF	I	L	QMS Select L-ON (424T) H-OFF
41	E37	REEL-B	I	–	Reel Pulse Q072 (424T)
42	E36	REEL-A	I	–	Reel Pulse Q073
43	AVSS	AVSS	–	–	AD Converter GND
44	AVR^-	AVR^-	–	–	AD Converter Reference GND
45	AVR^+	AVR^+	–	–	AD Converter Reference VCC
46	AVCC	AVCC	–	–	AD Converter Power Supply
47	AN7	–	–	–	–
48	AN6	KEY4	I	H	AD Converter Key Matrix
49	AN5	KEY3	I	H	AD Converter Key Matrix
50	AN4	KEY2	I	H	AD Converter Key Matrix
51	AN3	KEY1	I	H	AD Converter Key Matrix
52	AN2	KEY0	I	H	AD Converter Key Matrix
53	AN1	MET R	I	H	Rch Level Meter
54	AN0	MET L	I	H	Lch Level Meter
55	R8	R-Mute	O	L	REC Mute
56	R9	Bias	O	L	Bias Control
57	R0	L-Mute	O	L	Line Mute
58	R11	RTC	O	H	Reel Motor Torque
59	R12	RMZ	O	H	Reel Motor Drive FWD
60	R13	RM1	O	H	Reel Motor Drive REV
61	R14	CPM	O	H	Capstan Motor Drive
62	R15	SOL	O	L	Solenoid Drive
63	N·C	–	–	–	N·C
64	VCC	VCC	–	–	Power Supply 5V


005D
002D
006D
5128
3x8(M)
001D
006D
002D
005D
5128
3x8(U)
A001
035B
022B
PU33
032B
5128
3x8(B)
002B
003B
5128
3x8(U)
5128
3x8(B)
A
040B
041B
5130
2x5(B)
011B
004B
013B
023B
008B
001B
021B
001C
5128
3x8(U)
031B
052B
020C
016B
018B
017B
030B
006B
5128
3x8(B)
5128
3x8(B)
A
PU03
5128
3x8(U)
014B
5128
3x8(U)
036B
037B
VU01
024B
050B
038B
5128
3x6(B)
801K
5128
3x6(B)
5128
3x8(U)
015G
802K
803K
5110
3x8(S)
5128
3x8(U)
PU80
012G
5128
3x8(M)
903G
W001
J091
5128
3x8(M)
PW03
900G
5128
3x8(U)
PJ03
045B
010G
PU63
PU93
L801
001G
005G
5128
3x8(B)
005G
5128
3x8(B)

(438T)

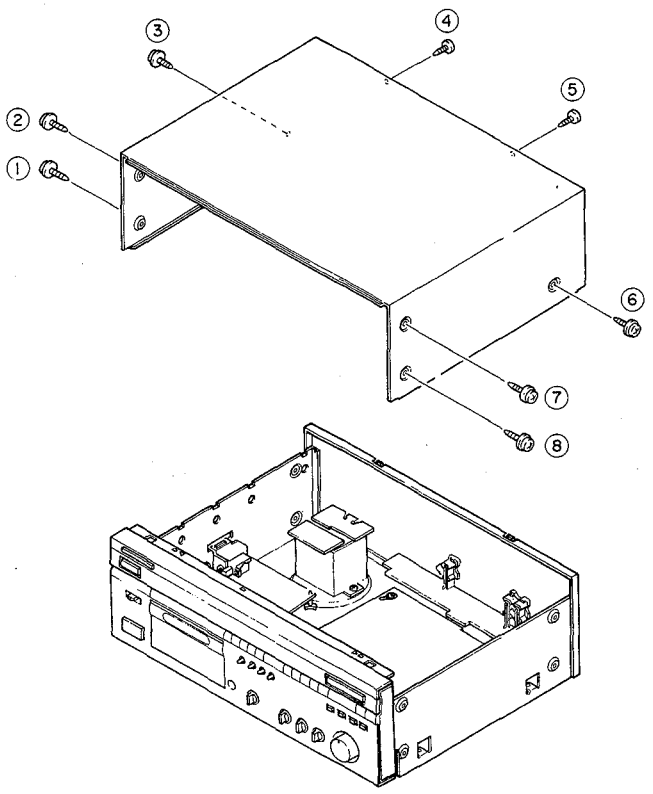
REF. DESIG.	PART NO.	DESCRIPTION
001B	4822 443 41044	Front Panel (BLK) /01B/02B/05B/07B
	4822 443 41045	Front Panel (GLD)/01G/02G
002B	4822 443 30756	Front Panel (BLK) /01B/02B/05B/07B
	4822 443 41043	Front Panel (GLD)/01G/02G
003B	4822 454 11825	Badge, Marantz (BLK) /01B/02B/05B/07B
	4822 454 10855	Badge, Marantz (GLD)/01G/02G
004B	4822 464 50772	Chassis, Front (BLK) /01B/02B/05B/07B
	4822 464 50841	Chassis, Front (GLD)/01G
	4822 443 41042	Chassis, Front (NO PAINT)/02G
006B	4822 276 80355	Contactor
008B	4822 410 60198	Button Assembly, Macha/Mode (BLK)/01B/02B/05B/07B
	4822 410 61147	Button Assembly, Macha/Mode (GLD)/01G/02G
011B	4822 410 60193	Cover (BLK)/01B/02B/05B/07B
	4822 410 61145	Cover (GLD)/01G/02G
013B	4822 450 61403	Window
016B	4822 464 50771	Cover, Cassette Holder
017B	4822 443 62786	Cover, Cassette (BLK) /01B/02B/05B/07B
	4822 443 63271	Cover, Cassette (GLD)/01G/02G
018B	4822 450 61402	Window, Cassette
021B	4822 410 60194	Button, Power (BLK) /01B/02B/05B/07B
	4822 410 60358	Button, Power (GLD)/01G/02G
022B	4822 410 60195	Button, Eject
023B	4822 410 60196	Button, Play/Stop (BLK) /01B/02B/05B/07B
	4822 410 61146	Button, Play/Stop (GLD)/01G/02G
024B	4822 410 60197	Button, NR (BLK) /01B/02B/05B/07B
	4822 410 60394	Button, NR (GLD)/01G/02G
030B	4822 413 31572	Knob, Rec Level (BLK) /01B/02B/05B/07B
	4822 413 41641	Knob, Rec Level (GLD)/01G/02G
031B	4822 410 60873	Knob, Sub Volume (BLK) /01B/02B/05B/07B
	4822 413 41642	Knob, Sub Volume (GLD)/01G/02G
032B	4822 413 31574	Knob, Timer (BLK) /01B/02B/05B/07B
	4822 413 31655	Knob, Timer (GLD)/01G/02G
035B	4822 403 30749	Lever, Eject
036B	4822 403 53806	Holder, FL
037B	4822 454 12431	Sticker, FL
038B	4822 404 20958	Link, Power Switch
041B	4822 466 92367	Dumper
052B	4822 532 12107	Washer, Holder
001C	4822 256 91484	Holder Assembly, Cassette
020C	4822 492 70276	Spring, Cassette Holder
002D	4822 501 11008	B.T. Screw 4x8(M) /01B/02B/05B/07B
005D	4822 444 60607	Cap, Side Panel /01G/02G
006D	4822 447 50121	Side Panel /01G/02G
005G	4822 462 41383	Leg
010G	4822 532 11276	B.T. Screw B4 x 8
903G	4822 532 60948	Bushing, AC Cord

REF. DESIG.	PART NO.	DESCRIPTION
▲ J091	4822 272 10227	Voltage Selector /01B/01G
▲ L801	4822 146 30796	Power Transformer /02B/05B/07B/02G
	4822 146 21619	Power Transformer /01B/01G
001T	4822 736 21201	User Manual

5. DISASSEMBLY

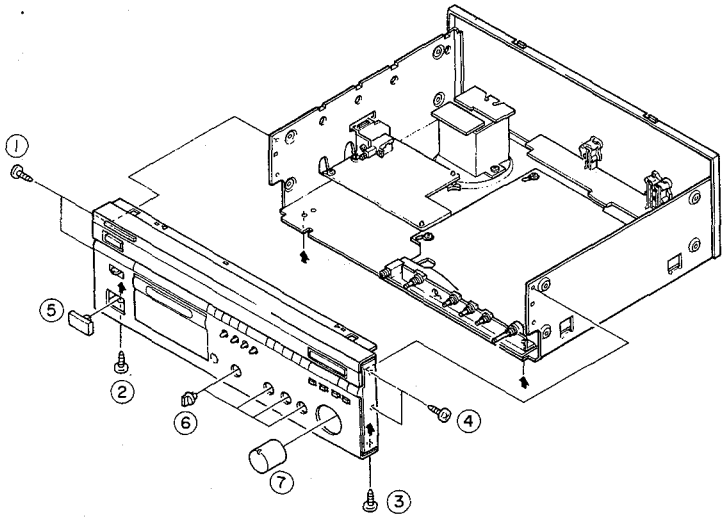
5.1 REMOVING THE TOP COVER

Remove the 8 screws ① ~ ⑧.



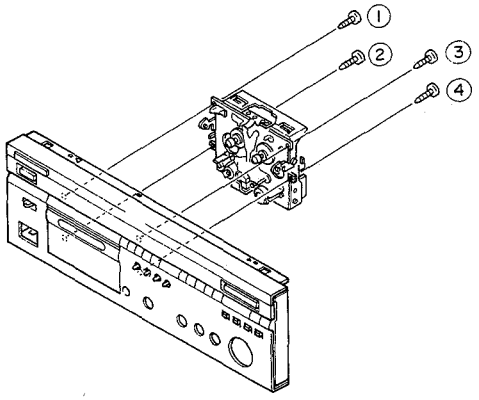
5.2 REMOVING THE FRONT PANEL

1) Remove the screws ① ~ ④.
2) Remove the Button ⑤ and Knob ⑥, ⑦.



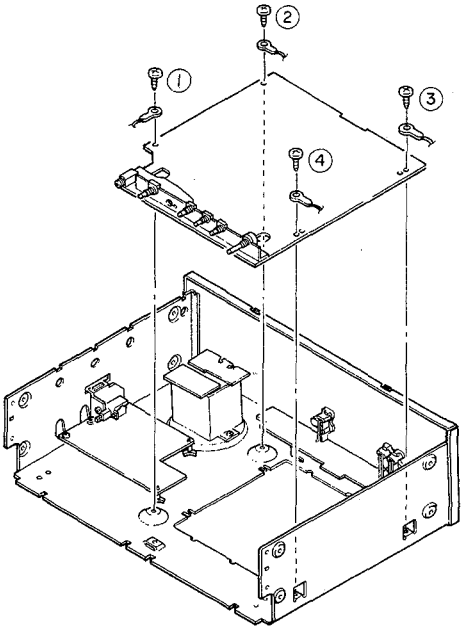
5.3 REMOVING THE MAIN P.W. BOARD

Remove the screws ① ~ ④.



5.4 REMOVING THE MECHANISM

Remove the screws ① ~ ④.



6. TEST EQUIPMENT REQUIRED FOR SERVICING

For measuring or checking your Cassette Deck, the following instruments and materials are necessary.

- Audio Oscillator (AF OSC)
- Attenuator (600 Ω)
- VTVM
- Oscilloscope
- Wow and Flutter Meter
- Torque Meter (Cassette Type)
- Digital Frequency Counter
- Black Tapes (Completely erased with bulk eraser)
  AC-224 (Normal)
  AC-513 (CrO_2)
  AC-712 (Metal)

NOTE:
If any doubt is noted in a measured value, use new tape.

- Test Tape

TCC-112·MTT-111	Wow and Flutter, Tape Speed
TCC-140·MTT-112B	Signal-to-Noise Ratio
TCC-130·MTT-150	Level Adjustment
TCC-161·MTT-256	Frequency Response (for Normal)
TCC-261·MTT-356	Frequency Response (for CrO_2 and Metal)
TCC-192·MTT-121	Cross Talk
TCC-194·MTT-141	Channel Separation
TCC-174A·MTT-255M (A-BEX)·(TEAC)	Azimuth adjustment

- Mirror cassette 12 μm padless
  TCC-902·MTT-902 Tape travel check
- Head and guide gauge (M-300)
  THG-801

7. ELECTRICAL ADJUSTMENTS

(A) Remark for adjustment

1) Test tapes damp easily. Erase magnetism of heads and capstans, etc. completely with head erasers before using them.
2) Keep away from measuring instruments have transformer inside and tape eraser.
3) The method of magnetism erase: turn the head eraser on a little away from the sets. Then, close heads and capstans and move up and down 4 – 5 times. Turn them off after making distance slowly.
4) Tools you are going to use should not be magnetized. Erase magnetic them by bulkeraser sometimes.
5) Adjust semi-fixed resistor for adjustment and variable coil, etc. spin and the number of times as less as possible.
6) Adjust and check SPEED and WOW, etc. by normal sets condition.
7) A little bond lock and pay attention to sticking around and flowing.
8) Check AC voltage input and audio signal generator output voltage 2 – 3 times per day to operate as normal.

(B) S.R.L/Standard Recording Level

1. S.R.L (Standard Recording Level) which is 160 nWb/m on a tape by* OPEN CIRCUIT MAGNETIC FLUX. The relationship among recording level, meter scale and test tape are as follows:

• OPEN CIRCUIT MAGNETIC FLUX (nWb/m)	160	185	200	220	250	
• OUR STANDARD METER SCALE	−3	−2	−1	0	+1	dB
• CLOSED CIRCUIT MAGNETIC FLUX (nWb/m)	**	160	185	200 ***	****	

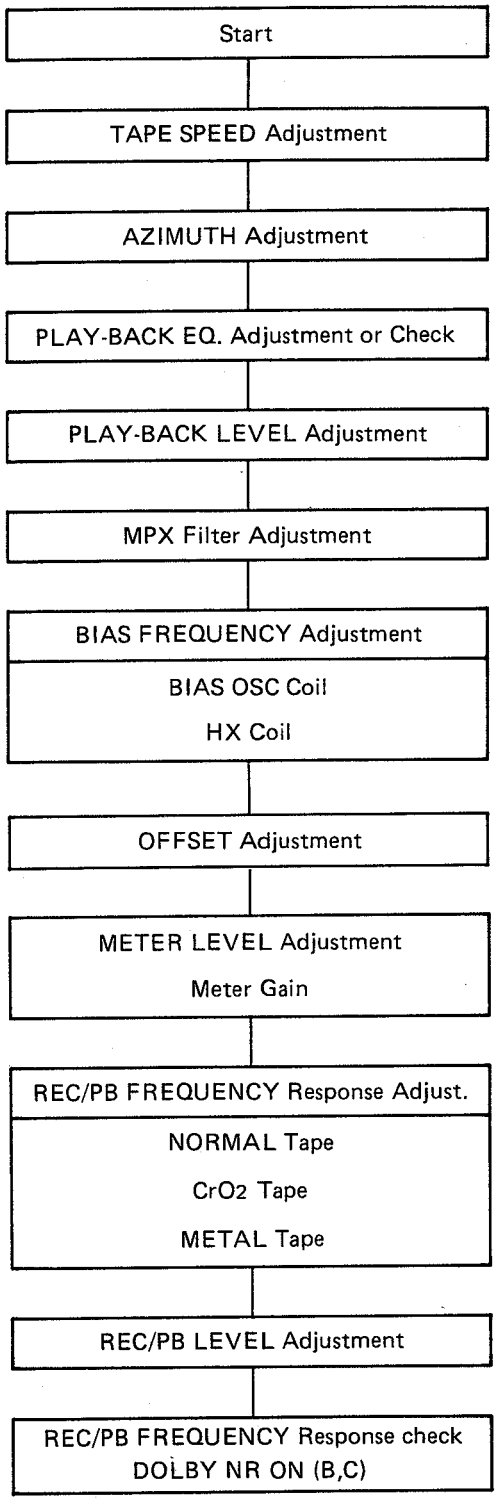
(*): OPEN CIRCUIT MAGNETIC FLUX = CLOSED CIRCUIT MAGNETIC FLUX + LEAK MAGNETIC FLUX.
(**): S.R.L
(***): TCC-120 (IEC REFERENCE LEVEL) (MTT-212)
(****): TCC-130 (DOLBY REFERENCE LEVEL) (MTT-150)

2. S.R.L Setting As for sets, DOLBY LEVEL is usually standard, it will be as follows:

1) Recording condition is to add 1 kHz, 100 mV signals on LINE INPUT.
2) Adjust REC VOLUME and should be dBm (245 mV) at DOLBY test point J601.
3) From this condition, input level is −3 db (3 dB down by attenuator). It is the standard recording condition at STANDARD RECORDING LEVEL. (S.R.L)

(Note) Depending on measurement items, playing standard level changes a lot. Recording level of specified test tape decides the standard level.

ADJUSTMENT FLOW CHART



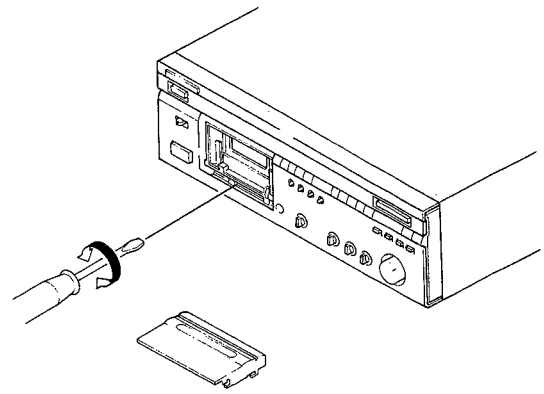
7.1 TAPE SPEED ADJUSTMENT

1) Play the middle of the tape and adjust semi-fixed resistor in motor and to be 3000 Hz (2990 – 3010 Hz).
2) After the set-up, play it again and check within range.

Remarks:
1) Carry them out the set condition.
2) Do not test the mechanism when the condition has a big difference of normal temperature.

7.2 HEAD AZIMUTH ADJUSTMENT AND PLAY-BACK FREQUENCY RESPONSE ADJUSTMENT (OR CHECK)

1) Play the frequency response tape and screw the AZIMUTH adjust screw at 12.5 kHz signal. Then, set output maximum to the screwed-up direction.
2) In case L/R peak point is difference, turn the lower channel maximum, keep the L/R balance.
3) Bondlock adjust screw.
4) Next, 315 Hz signal should be 0 dB and read 12.5 kHz signal level. In case the set is non-adjustment type, check the value whether it is normal.



7.3 PLAY-BACK LEVEL ADJUSTMENT

1) Play the DOLBY test tape, adjust semi-fixed resistor for adjustment L/RJ29, R/RJ30 at test point J601. Then, set dBm (245 mV).
2) After adjustment, replay and check it again.

Remarks:
1) In case of drifting replay output, check the tape running and the test tape because it might be defective.

7.4 MPX FILTER ADJUSTMENT

1) Should be recording monitor by DOLBY LEVEL. Input signal level is 0 dB at 1 kHz.
2) Input signal frequency is 19 kHz (within ±10 Hz). Adjust L/L651, R/L652 that MPX-F or DOLBY NR switch (model by) should be "ON" and the level is minimum.

Remarks:
1) It is under –40 dB as usual.

7.5 RECORDING BIAS FREQUENCY AND HX COIL ADJUSTMENT

1) Operate to REC mode at METAL position.
2) High impedance through test point JL01 and connect to measurement. (FREQUENCY COUNTER and OSCILLOSCOPE through AUDIO VOLT METER)
3) Adjust a bias-oscillated coil LL01 to be 105 kHz bias-oscillated frequency.
4) Adjust HX COIL L/L901, R/L902 and set the output maximum.

Remarks:
1) It is easy that make a high impedance sensor by 1 Mohm resistor.

7.6 OFFSET ADJUSTMENT

1) Cut the line input.
2) Adjust RX03 to the segment (–35) of the level meter just light off.

7.7 LEVEL METER SENSITIVITY ADJUSTMENT OR CHECK

1) Set REC-PAUSE by LINE INPUT 1 kHz 100 mV (ATTENUATOR –20 dB). Next, adjust REC-LEVEL volume and should be the level –10 dBm (245 mV) at DOLBY test point J651.
2) In this condition, adjust semi-fixed resistor L/RX01, R/RX02 to light point of 0 dB.

Remarks:
1) DOLBY NR position is "OFF".

7.8 REC/PLAY-BACK FREQUENCY RESPONSE ADJUSTMENT

1) Decrease –25 dB INPUT LEVEL from S.R.L setting. Record 1 kHz and 12.5 kHz signals at DOLBY-C position. (NORMAL tape/position)
2) REWIND and PLAY it, and read difference level at 1 kHz and 12.5 kHz.
3) Adjust semi-fixed resistor L/R901, R/R902 that the level of differences 1 kHz and 12.5 kHz should be 0 ~ +1.0 dB by HX-PRO on. HX-PRO off L/R923, R/R924.
4) Do this same thing to CrO_2 tape/position and adjust semi-fixed resistor R933.
5) Do this same thing to METAL tape/position and adjust semi-fixed resistor R934.
6) At CrO_2 and METAL tape/position, the level of differences 1 kHz and 12.5 kHz should be 0 ~ ±1.0 dB.

7.9 REC/PLAY-BACK LEVEL ADJUSTMENT

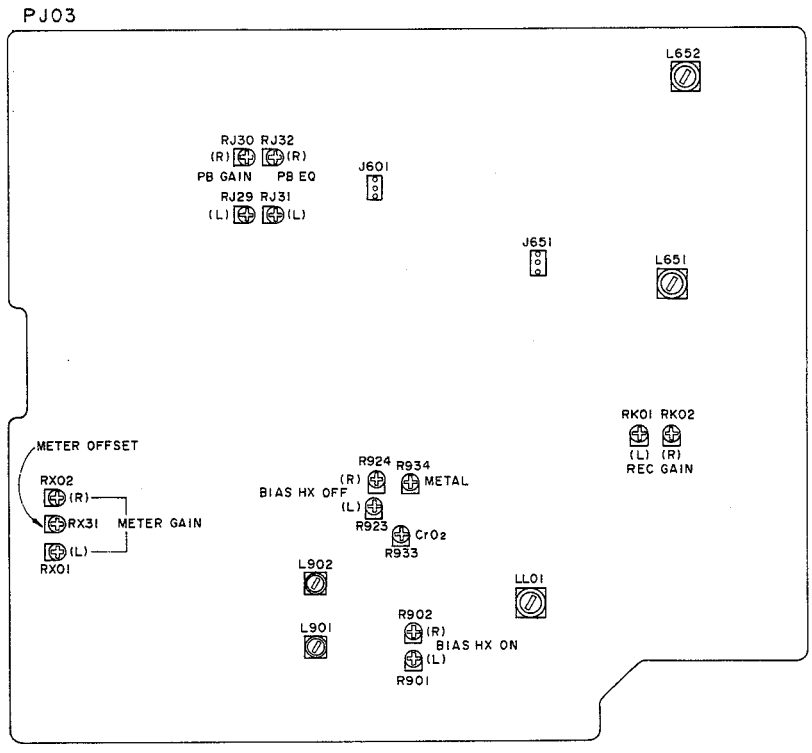
1) By NORMAL tape/position, set S.R.L setting and set monitor level scale 0 dB.
2) Do REWIND and PLAY it and adjust semi-fixed resistor L/RK01, R/RK02 to be 1 kHz level within ±0.5 dB.
3) Only check CrO_2 and METAL tapes/positions. In these case, to be 1 kHz level within ±1.0 dB.

7.10 REC/PLAY-BACK FREQUENCY RESPONSE CHECK DOLBY NR

1) Decrease –22 dB INPUT LEVEL from S.R.L setting. Record 1 kHz and 12.5 kHz signals at DOLBY B position. (NORMAL tape/position)
2) REWIND and PLAY it, and read difference level at 1 kHz and 12.5 kHz.
3) Do this same thing to CrO_2 and METAL tape/position.
4) Do same check at DOLBY C position.

Remarks:
1) Within specifications.

ADJUSTMENT POINT COMPONENT SIDE



8. SERVICE ROUTINE OF MICRO-PROCESSOR

Making Power ON while pressing Stop Key and Pause Key results in Service Routine.

NOTE:
Key is not accepted until 4 seconds passed.

Service Routine has 4 modes as follows.

1. Endless Play
   Press Play Key to make Play mode. At the end of a Tape it is turned back to it's head and is played again.
   This Process is repeated automatically.
   Pressing Stop Key releases this mode.
2. Quick Rec
   Press Rec Key to make Rec mode directly. If Rew Key is pressed during Rec mode a Tape is returned to the starting point of recording and then it is played automatically.
   Pressing Stop Key releases this mode.
3. FL Check
   Press Mode Key to light all of FL. Under this state press M Call Key to put out the light of each Segment one by one.
   Pressing Stop Key releases this mode.
4. Port Check
   When Memo Key is pressed the number of Port and active is indicated in the Character indication. When Reset Key is pressed under this state active in the Port rolls.
   Press FF or REW Key to choose the Port. Only output Port is indicated.
   Pressing Stop Key releases this mode.
   CAUTION:
   Disconnect the mechanical connector before performing this check.

Only above-mentioned Key can be accepted by Service Routine. Service Routine is effective until Power becomes OFF and μ-COM is reset.

9. DOLBY HX PRO

Dolby HX Pro headroom extension measures the sum of audio and ultrasonic bias at the record head and varies the bias oscillator output level in order to maintain constant active bias. Fig. 1. is a block diagram of the system showing the basic structure.

In order to determine the key parameter, "active bias," first the flux in the record head must be found. Due to a number of factors, it is not possible to assume a linear relationship between current in the head and flux level. However, a reasonable indication of the flux may be obtained by integrating the voltage at the record head since the voltage drop across the tape head copper resistance is negligible compared to the voltage drop across its inductance.

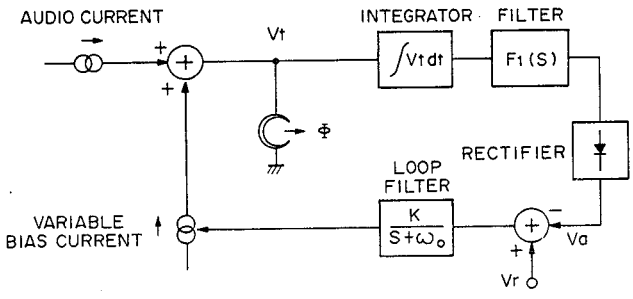


Fig. 1 HX Pro block diagram

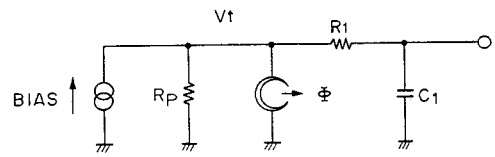


Fig. 2 Combined integrator and F1(s)

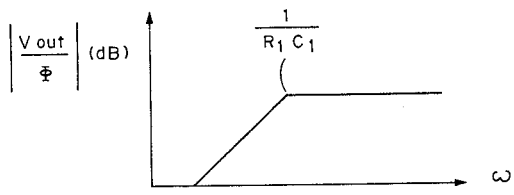


Fig. 3 Transfer characteristic of integrator and F1(s)

Once a signal representative of recording flux has been generated, it is necessary to determine a filter, F1(s), corresponding to the relationship between a frequency and its ability to act as bias. This is done by examining the self-bias of single tones from 5 to 10 kHz versus signal level. By adjusting the fixed bias current so that optimum linearity is achieved at each signal level, a family of curves will result which naturally confirms that higher-frequency signals contribute more to active bias than the lower frequencies. A first-order high-pass filter with a corner at 50% of the full audio bandwidth (about 10 kHz) is a good approximation of the required function F1(s). This function can be combined with the integrator resulting in the simple circuit of Fig. 2, having the desired response shown in Fig. 3.

Now that a signal relating to active bias has been derived, it must be rectified and smoothed into an appropriate control voltage. A fast peak rectifier is used since its output is proportional to the dominant parameter of active bias, the peak amplitude.

The control voltage is compared to the reference voltage used to set the fixed bias level for the tape being used. The correction signal thus generated is supplied to a voltage-controlled amplifier to vary the ultrasonic bias signal in the record head to a level which maintains a constant active bias level.

For example, if an audio signal consisting of only low frequencies is recorded, the ultrasonic bias level will remain unchanged since the signal will not be detected by the control circuit after filtering by F1(s). If, however, the signal consists of only high frequencies, the HX Pro system will detect them and reduce the ultrasonic bias to a point close to the optimum for that signal, improving linearity.

Finally, if a signal with both low and high-frequency content is recorded, the HX Pro circuit will again reduce the ultrasonic bias signal in response to the high-frequency content and in doing so will approximately compensate for the mutual biasing effect of the high-frequency audio signal on the low-frequency signal. Therefore, the low frequencies and the high frequencies are recorded with a degree of constant active bias, giving the recording process enhanced stability.

In addition to the improved stability there comes a measurable increase in high-frequency headroom as a result of preventing the over-bias condition caused by signal self bias.

Essentially, the HX Pro circuit is a servo system which operates to stabilize the DC control voltage from the peak rectifier. The final stage before the VCA is the loop filter which is necessary to statilize the servo action. It should be pointed out that the overall response time of the HX Pro circuit to a change in the input signal should be fast enough to follow the envelope of the change so that the active bias is correct under all signal conditions. A step response time, Ts, of 1 millisecond has therefore been chosen for the system.

Since the operation of the HX Pro system is so closely related to the audio signal in the channel, separate circuits must be used for each recording channel so that fully independent operation is achieved.

10. ELECTRICAL PARTS LIST

(438T)

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W
① — Resistance value

Examples
① Resistance value

0.1Ω...001	10Ω...100	1kΩ...102	100kΩ...104
0.5Ω...005	18Ω...180	2.7kΩ...272	680kΩ...684
1Ω...010	100Ω...101	10kΩ...103	1MΩ...105
6.8Ω...068	390Ω...391	22kΩ...223	4.7MΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1---370, Ceramic condenser
①② Disc type
Temp. coeff. P350 ~ N1000, 50V
Capacity value
Tolerance

Examples
① Tolerance (Capacity deviation)
±0.25pF...0
±0.5pF...1
±5%...5
* Tolerance of COMMON PARTS handled here are as follows:
0.5pF ~ 5pF...±0.25pF
6pF ~ 10pF...±0.5pF
12pF ~ 560pF...±5%
② Capacity value

0.5pF...005	3pF...030	100pF...101
1pF...010	10pF...100	220pF...221
1.5pF...015	47pF...470	560pF...561

C***: CERAMIC CAP.
(1) DK16---300, High dielectric constant ceramic condenser
① Disc type
Temp. chara. 2B4, 50V
Capacity value

Example
② Capacity value

100pF...101	1000pF...102	10000pF...103
470pF...471	2200pF...222	

C***: ELECTROLY CAP. (⇄), FILM CAP. (⇆)
(1) EA------10, Electrolytic condenser
①② One-way lead type, Tolerance ±20%
Dielectric strength
Capacity value

Examples
① Capacity value

0.1μF...104	4.7μF...475	100μF...107
0.33μF...334	10μF...106	330μF...337
1μF...105	22μF...226	1100μF...108
		2200μF...228

② Working voltage

6.3V...006	25V...025
10V...010	35V...035
16V...016	50V...050

(2) DF15---350, Plastic film condenser
① One-way type, Mylar ±5% 50V
Capacity value

Examples
① Capacity value

0.001μF (1000pF)...102	0.1μF...104
0.0018μF.....182	0.56μF...564
0.01μF.....103	1μF...105
0.015μF.....153	

REF. DESIG.	PART NO.	DESCRIPTION		
		PJ03-MAIN CIRCUIT BOARD		
		PJ03-CAPACITORS		
CB01	4822 124 22703	Elect	0.22μF	50V
CB02	4822 124 22273	Elect	0.47μF	50V
CB03	4822 122 40491	Ceramic	0.022μF	+80% −20%
CB04	4822 122 40491	Ceramic	0.022μF	+80% −20%
CB05	5322 126 10364	Ceramic	100pF	±5%
CB06	4822 122 40491	Ceramic	0.022μF	+80% −20%
CB07	4822 124 41543	Elect	1μF	50V
CB08	4822 124 90354	Elect	100μF	16V
CB09	4822 126 11726	Ceramic	2200pF	+80% −20%
CG11	4822 124 90364	Elect	220μF	16V
CG12	4822 124 90364	Elect	220μF	16V
CJ01	4822 126 11726	Ceramic	2200pF	+80% −20%
CJ02	4822 126 11726	Ceramic	2200pF	+80% −20%
CJ03	4822 124 90364	Elect	220μF	16V
CJ04	4822 124 90364	Elect	220μF	16V
CJ15	4822 121 43995	Film	220pF	±5%
CJ16	4822 121 43995	Film	220pF	±5%
CJ31	4822 124 22277	Elect	470μF	16V
CJ32	4822 124 22277	Elect	470μF	16V
CJ33	4822 124 22722	Elect	1000μF	16V
CJ34	4822 124 22722	Elect	1000μF	16V
CK01	4822 124 22273	Elect	0.47μF	50V
CK02	4822 124 22273	Elect	0.47μF	50V
CK03	4822 122 32185	Ceramic	10pF	±0.5pF
CK04	4822 122 32185	Ceramic	10pF	±0.5pF
CK09	4822 124 22571	Elect	10μF	50V
CK10	4822 124 22571	Elect	10μF	50V
CK11	5322 126 10364	Ceramic	100pF	±5%
CK12	5322 126 10364	Ceramic	100pF	±5%
CK15	4822 126 11127	Ceramic	470pF	
CK16	4822 126 11127	Ceramic	470pF	
CK17	4822 126 10408	Ceramic	220pF	
CK18	4822 126 10408	Ceramic	220pF	
CK19	4822 126 10734	Ceramic	100pF	
CK20	4822 126 10734	Ceramic	100pF	
CK25	4822 124 22571	Elect	10μF	50V
CK26	4822 124 22571	Elect	10μF	50V
CK31	4822 122 40491	Ceramic	0.022μF	+80% −20%
CK40	4822 124 90364	Elect	220μF	16V
CK41	4822 124 90364	Elect	220μF	16V
CL04	4822 124 22274	Elect	4.7μF	50V
CL05	4822 121 43027	Film	0.015μF	±5%
CL07	4822 124 22274	Elect	4.7μF	16V
CR13	4822 122 40617	Ceramic	0.1μF	
CU53	4822 122 40491	Ceramic	0.022μF	+80% −20%
CU54	4822 122 40491	Ceramic	0.022μF	+80% −20%
CW09	4822 122 40617	Ceramic	0.1μF	+80% −20%
CW10	4822 122 40491	Ceramic	0.022μF	+80% −20%
CW14	4822 122 40617	Ceramic	0.1μF	+80% −20%
CX01	4822 124 22571	Elect	10μF	50V
CX02	4822 124 22571	Elect	10μF	50V
CX03	4822 124 22274	Elect	4.7μF	50V
CX04	4822 124 22274	Elect	4.7μF	50V

REF. DESIG.	PART NO.	DESCRIPTION
C601	4822 124 22274	Elect 4.7μF 50V
C602	4822 124 22274	Elect 4.7μF 50V
C603	4822 126 10409	Ceramic 560pF ±10%
C604	4822 126 10409	Ceramic 560pF ±10%
C607	4822 126 10411	Ceramic 820pF ±10%
C608	4822 126 10411	Ceramic 820pF ±10%
C611	4822 124 22273	Elect 0.47μF 50V
C612	4822 124 22273	Elect 0.47μF 50V
C617	4822 124 22703	Elect 0.22μF 50V
C618	4822 124 22703	Elect 0.22μF 50V
C627	4822 124 22274	Elect 4.7μF 50V
C628	4822 124 22274	Elect 4.7μF 50V
C629	4822 122 33658	Ceramic 2200pF +80% –20%
C630	4822 122 33658	Ceramic 2200pF +80% –20%
C631	4822 124 22039	Elect 220μF 16V
C632	4822 124 22039	Elect 220μF 16V
C633	4822 124 90354	Elect 100μF 16V
C634	4822 124 90354	Elect 100μF 16V
C651	4822 124 22274	Elect 4.7μF 50V
C652	4822 124 22274	Elect 4.7μF 50V
C653	4822 126 10409	Ceramic 560pF ±10%
C654	4822 126 10409	Ceramic 560pF ±10%
C657	4822 126 10411	Ceramic 820pF ±10%
C658	4822 126 10411	Ceramic 820pF ±10%
C661	4822 124 22273	Elect 0.47μF 50V
C662	4822 124 22273	Elect 0.47μF 50V
C667	4822 124 22703	Elect 0.22μF 50V
C668	4822 124 22703	Elect 0.22μF 50V
C677	4822 124 22274	Elect 4.7μF 50V
C678	4822 124 22274	Elect 4.7μF 50V
C681	4822 124 22274	Elect 4.7μF 50V
C682	4822 124 22274	Elect 4.7μF 50V
C683	4822 124 22274	Elect 4.7μF 50V
C684	4822 124 22274	Elect 4.7μF 50V
C691	4822 122 40586	Ceramic 0.01μF ±20%
C692	4822 122 40586	Ceramic 0.01μF ±20%
C693	4822 122 40617	Ceramic 0.1μF +80% –20%
C814	4822 122 40491	Ceramic 0.022μF +80% –20%
C900	4822 122 40306	Ceramic 0.47μF +80% –20%
C901	4822 126 10409	Ceramic 560pF ±10%
C902	4822 126 10409	Ceramic 560pF ±10%
C909	4822 126 10734	Ceramic 100pF ±10%
C910	4822 126 10734	Ceramic 100pF ±10%
C911	4822 122 40306	Ceramic 0.047μF +80% –20%
C912	4822 122 40306	Ceramic 0.047μF +80% –20%
C913	4822 121 43775	Film 560pF ±10%
C914	4822 121 43775	Film 560pF ±10%
C931	4822 122 40306	Ceramic 0.047μF +80% –20%
C932	4822 122 40306	Ceramic 0.047μF +80% –20%
C933	4822 124 22571	Elect 10μF 50V
C934	4822 122 32185	Ceramic 10pF ±0.5pF
C935	4822 126 11727	Ceramic 1.5μF +80% –20%
		PJ03-RESISTORS
RB17	4822 050 21501	150Ω ±5% ½W
RG05	4822 050 26809	68Ω ±5% 1/6W
RG06	4822 050 26809	68Ω ±5% 1/6W
▲ RG11	4822 113 90229	56Ω ±5% ¼W, Fuse
▲ RG12	4822 113 90229	56Ω ±5% ¼W, Fuse
RG15	4822 102 10403	20KΩ(A)x2, Variable

REF. DESIG.	PART NO.	DESCRIPTION
RJ29	4822 100 11372	47KΩ, Trimming
RJ30	4822 100 11372	47KΩ, Trimming
RJ31	4822 100 11352	22KΩ, Trimming
RJ32	4822 100 11352	22KΩ, Trimming
▲ RJ55	4822 113 90119	22Ω ±2% ¼W, Fuse
▲ RJ56	4822 113 90119	22Ω ±2% ¼W, Fuse
RJ57	4822 050 21021	100Ω ±5% ¼W
RJ58	4822 050 21021	100Ω ±5% ¼W
RK01	4822 100 11352	22KΩ, Trimming
RK02	4822 100 11352	22KΩ, Trimming
RK40	4822 102 10402	20KΩ(B)x2, Variable
▲ RK48	4822 113 90229	56Ω ±2% ¼W, Fuse
▲ RK49	4822 113 90229	56Ω ±2% ¼W, Fuse
RV01	4822 102 10401	100KΩ(A)x2, Variable
RV02	4822 102 10399	250KΩ(W), Variable
RX01	4822 100 11471	100KΩ, Trimming
RX02	4822 100 11471	100KΩ, Trimming
RX31	4822 100 11373	4.7KΩ, Trimming
▲ R631	4822 115 90194	15Ω ±2% ¼W, Fuse
▲ R632	4822 115 90194	15Ω ±2% ¼W, Fuse
R901	4822 100 11372	47KΩ, Trimming
R902	4822 100 11372	47KΩ, Trimming
R923	4822 100 11372	47KΩ, Trimming
R924	4822 100 11372	47KΩ, Trimming
R933	4822 100 11372	47KΩ, Trimming
R934	4822 100 11372	47KΩ, Trimming
R940	4822 101 90187	10KΩ, Variable
		PJ03-SEMICONDUCTORS
DJ01	4822 130 33305	Diode 1SS176, etc.
DJ02	4822 130 33305	Diode 1SS176, etc.
DJ03	4822 130 80839	Diode S5688G
DJ04	4822 130 80839	Diode S5688G
DJ10	4822 130 80839	Diode S5688G
DJ11	4822 130 80839	Diode S5688G
DK01	4822 130 33305	Diode 1SS176, etc.
DK02	4822 130 33305	Diode 1SS176, etc.
DK03	4822 130 80316	Zener 3.6V
DK04	4822 130 33305	Diode 1SS176, etc.
DL01	4822 130 80839	Diode S5688G
DL31	4822 130 80272	Zener 7.5V
DS01 ~ DS06	4822 130 33305	Diode 1SS176, etc.
DT11	4822 130 80091	Zener 12V
DT12	4822 130 33305	Diode 1SS176, etc.
DT13	4822 130 33305	Diode 1SS176, etc.
DT60	4822 130 80091	Zener 12V
DX01 ~ DX04	4822 130 33305	Diode 1SS176, etc.
D631	4822 130 33305	Diode 1SS176, etc.
D632	4822 130 33305	Diode 1SS176, etc.
D633	4822 130 80273	Zener 8.2V
D634	4822 130 80273	Zener 8.2V
D931	4822 130 33305	Diode 1SS176, etc.
D932	4822 130 33305	Diode 1SS176, etc.

REF. DESIG.	PART NO.	DESCRIPTION
QB01	4822 209 83706	IC BA335PK
QB02	4822 130 42298	Transistor 2SC536SP, etc.
QB03	4822 130 42298	Transistor 2SC536SP, etc.
QB04	4822 130 61189	Transistor DTC114TS, Digital
QB05	4822 130 61186	Transistor DTA114TS, Digital
QB06	4822 130 61189	Transistor DTC114TS, Digital
QG01	4822 209 61187	IC BA15218
QJ01	4822 130 42839	F.E.T. 2SK369(BL)
QJ02	4822 130 42839	F.E.T. 2SK369(BL)
QJ03	4822 130 42839	F.E.T. 2SK369(BL)
QJ04	4822 130 42839	F.E.T. 2SK369(BL)
QJ05	4822 130 42836	F.E.T. 2SK246(Y, GR)
QJ06	4822 130 42836	F.E.T. 2SK246(Y, GR)
QJ31	4822 209 73064	IC NJM2068DD
QJ32	4822 130 61189	Transistor DTC114TS, Digital
QK01	4822 209 83726	IC AN6208N
QK11	4822 130 61189	Transistor DTC114TS, Digital
QK12	4822 130 61189	Transistor DTC114TS, Digital
QL01	4822 130 42376	Transistor 2SC2655(O, Y)
QL02	4822 130 42376	Transistor 2SC2655(O, Y)
QL31	4822 130 42125	Transistor 2SD1302(S, T)
QL32	4822 130 61186	Transistor DTA114TS, Digital
QS01	4822 130 61188	Transistor DTC144TS, Digital
QS02	4822 130 42715	Transistor 2SA608SP, etc.
QS03	4822 130 61186	Transistor DTA114TS, Digital
QS04	4822 130 61188	Transistor DTC144TS, Digital
QT03	4822 130 61189	Transistor DTC114TS, Digital
QT04	4822 130 61189	Transistor DTC114TS, Digital
QT07	4822 130 61892	Transistor 2SD2144S(U, V)
QT08	4822 130 61892	Transistor 2SD2144S(U, V)
QT11	4822 130 61189	Transistor DTC114TS, Digital
QT51	4822 209 83804	IC LC4966
QT52	4822 130 61189	Transistor DTC114TS, Digital
QT60	4822 130 61189	Transistor DTC114TS, Digital
QT61	4822 130 42298	Transistor 2SC536SP, etc.
QT62	4822 130 61892	Transistor 2SD2144S(U, V)
QT63	4822 130 61892	Transistor 2SD2144S(U, V)
QX01	4822 209 61187	IC BA15218
Q601	4822 209 73092	IC CX20187
Q631	4822 130 61724	Transistor 2SA934
Q632	4822 130 60173	Transistor 2SC2060(Q, R)
Q651	4822 209 73092	IC CX20187
Q653	4822 130 61189	Transistor DTC114TS, Digital
Q654	4822 130 61189	Transistor DTC114TS, Digital
Q901	4822 209 72874	IC μPC1297
Q921	4822 209 83804	IC 4966
Q931	4822 130 42298	Transistor 2SC536SP, etc.
Q932	4822 130 61189	Transistor DTC114TS, Digital
Q933	4822 130 61189	Transistor DTC114TS, Digital
		PJ03-MISCELLANEOUS
JG01	4822 265 30782	Jack, Headphone (BLK) /01B/02B/05B/07B
	4822 267 31324	Jack, Headphone (GREY)/01G/02G
JU34	4822 267 51115	Jack, 17P
LK01 ~ LK04	4822 157 53521	Choke Coil 22mH
LL01	4822 157 60189	OSC Transformer
LL03	4822 152 20622	Choke Coil 2.2mH
LL31	4822 152 20622	Choke Coil 2.2mH

REF. DESIG.	PART NO.	DESCRIPTION
L603	4822 157 53521	Choke Coil 22mH
L604	4822 157 53521	Choke Coil 22mH
L651	4822 157 52461	M.P.X. Coil
L652	4822 157 52461	M.P.X. Coil
L653	4822 157 53521	Choke Coil 22mH
L654	4822 157 53521	Choke Coil 22mH
L901	4822 157 60188	OSC Transformer
L902	4822 157 60188	OSC Transformer
L931	4822 157 60187	Choke Coil 2.2mH
L932	4822 157 60187	Choke Coil 2.2mH
L933	4822 157 60187	Choke Coil 2.2mH
L934	4822 157 60187	Choke Coil 2.2mH
		PU03-LOGIC/KEY SWITCH CIRCUIT BOARD
		PU03-CAPACITORS
CS01	4822 124 90357	Elect 2.2μF 50V
CS04	4822 124 90354	Elect 100μF 16V
CU02	4822 124 90363	Elect 220μF 10V
CW13	4822 126 11727	Ceramic 1.5μF
CW15	4822 126 11727	Ceramic 1.5μF
		PU03-RESISTORS
GU01	4822 111 91073	47KΩx5, Array
GU02	4822 116 90567	47KΩx4, Array
GU03	4822 111 91204	47KΩx6, Array
GU04	4822 111 91204	47KΩx6, Array
GU05	4822 111 91204	47KΩx6, Array
GU06	4822 111 91204	47KΩx6, Array
		PU03-SEMICONDUCTORS
DU04	4822 130 33305	Diode 1SS176, etc.
DU05	4822 130 80319	Zener 9.1V
DY03	4822 130 80326	L.E.D. LT3D8B
DY04	4822 130 80326	L.E.D. LT3D8B
QU01	4822 209 61189	Microprocessor MB88515
QU03	4822 130 61227	Transistor DTA114ES, Digital
QU04	4822 130 61189	Transistor DTC114TS, Digital
QU05	4822 130 61189	Transistor DTC114TS, Digital
QU06	4822 130 61227	Transistor DTA114ES, Digital
QU07	4822 130 61189	Transistor DTC114TS, Digital
QU08	4822 130 42298	Transistor 2SC536SP, etc.
QU09	4822 130 61189	Transistor DTC114TS, Digital
QU10	4822 130 61189	Transistor DTC114TS, Digital
QU13	4822 130 61189	Transistor DTC114TS, Digital
QU14	4822 130 61227	Transistor DTA114ES, Digital
QU15	4822 130 61227	Transistor DTA114ES, Digital
QU16	4822 130 61189	Transistor DTC114TS, Digital
QU17	4822 130 61227	Transistor DTA114ES, Digital
		PU03-MISCELLANEOUS
SS51 ~ SS54	4822 276 11944	Push Switch, Tact
SU14 ~ SU18	4822 276 20508	Push Switch, Tact
SU20 ~ SU29	4822 276 20508	Push Switch, Tact
VU01	4822 130 90683	Display Unit
XU01	4822 242 72596	Ceramic Viblator, CST6.00MG
JU01	4822 267 51116	Jack, 17P
JU04	4822 267 51116	Jack, 17P
WU01	4822 320 50239	Cable, 17P
WU04	4822 320 50239	Cable, 17P

REF. DESIG.	PART NO.	DESCRIPTION
		PU33-TIMER SWITCH CIRCUIT BOARD
SS11	4822 277 30867	Slide Switch, Timer
		PU80-POWER SUPPLY CIRCUIT BOARD
		PU80-CAPACITORS
CM81	4822 122 40491	Ceramic 0.022μF +80% −20%
CM82	4822 122 32486	Ceramic 0.01μF +80% −20%
CU51	4822 124 22274	Elect 4.7μF 50V
CU52	4822 124 90357	Elect 2.2μF 50V
C801	4822 122 40306	Ceramic 0.047μF +80% −20%
C802	4822 124 90367	Elect 2200μF 25V
C803	4822 124 90367	Elect 2200μF 25V
C804	4822 124 22722	Elect 1000μF 16V
C805	4822 124 22722	Elect 1000μF 16V
C807	4822 122 40306	Ceramic 0.047μF +80% −20%
C808	4822 124 90388	Elect 3300μF 16V
C809	4822 124 22703	Elect 0.22μF 50V
C810	4822 124 90354	Elect 100μF 16V
C811	4822 122 40306	Ceramic 0.047μF +80% −20%
C812	4822 124 90366	Elect 220μF 50V
C813	4822 122 40306	Ceramic 0.047μF +80% −20%
▲ C851	4822 122 33276	Ceramic 0.01μF ±20%
		PU80-RESISTORS
▲ R801	4822 116 21086	1Ω ±5% ½W, Fusible
▲ R802	4822 116 21086	1Ω ±5% ½W, Fusible
▲ R805	4822 116 60314	10Ω ±5% ¼W, Fusible
▲ R806	4822 116 83261	56Ω ±5% ¼W, Fusible
R808	4822 050 21501	150Ω ±5% ¼W
R810	4822 050 21501	150Ω ±5% ¼W
		PU80-SEMICONDUCTORS
DM01	4822 130 32508	Diode RL103E/DSF10C
DM02	4822 130 32508	Diode RL103E/DSF10C
DM81	4822 130 80272	Zener 7.5V
DM82	4822 130 33759	Zener 4.7V
DU01	4822 130 80317	Zener 5.1V
▲ DU02	4822 130 32508	Diode RL103E/DSF10C
DU03	4822 130 33305	Diode 1SS176, etc.
DU53	4822 130 33305	Diode 1SS176, etc.
▲ D801 ~ ▲ D818	4822 130 80839	Diode S5688G
D819	4822 130 80272	Zener 7.5V
QM01	4822 130 61725	Transistor 2SD2010
QM02	4822 130 42298	Transistor 2SC536SP, etc.
QM03	4822 130 61725	Transistor 2SD2010
QM81	4822 209 61188	IC BA6219
QM82	4822 130 42298	Transistor 2SC536SP, etc.
QM83	4822 130 42298	Transistor 2SC536SP, etc.
QM84	4822 130 61186	Transistor DTA114TS
QU51	4822 130 42372	Transistor 2SA1048-Y
QU52	4822 130 42372	Transistor 2SA1048-Y
▲ Q801	4822 209 60826	IC NJM78M12AF
▲ Q802	4822 209 63641	IC NJM79M12AF
Q803	4822 209 70385	IC L78MR05

REF. DESIG.	PART NO.	DESCRIPTION
		PU80-MISCELLANEOUS
▲ F801	4822 253 30361	Fuse 500mA 250V
J803	4822 267 51115	Jack, 17P
▲ S851	4822 276 11141	Push Switch, Power
		PU93-P.T. COVER CIRCUIT BOARD
		PW03-AUDIO IN/OUT CIRCUIT BOARD
CR13	4822 122 40617	Ceramic 0.1μF +80% −20%
CW01	4822 122 40617	Ceramic 0.1μF +80% −20%
CW02	4822 122 40586	Ceramic 0.01μF ±20%
CW03	4822 122 40586	Ceramic 0.01μF ±20%
CW08	4822 122 40617	Ceramic 0.1μF +80% −20%
QR01	4822 130 42594	Transistor DTC144ES, Digital
JW02	4822 265 30587	Terminal, 4P; RCA Pin
JR11	4822 266 30274	Terminal, 2P; RCA Pin

NOTE ON SAFETY:
Symbol ▲ Fire or electrical shock hazard. Only original parts should be uned to replace any part marked with symbol ▲. Any other component substitution (other than original type), mayincrease risk of fire or electrical shock hazard.